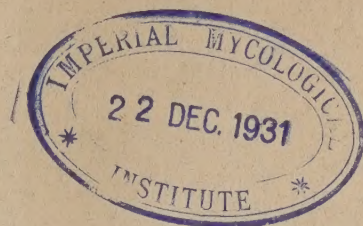


ADVISORY DEPARTMENT
OF THE IMPERIAL COLLEGE OF
TROPICAL AGRICULTURE.



REPORTS
ON THE
AGRICULTURAL DEPARTMENT
DOMINICA.
1929-30 and 1930-31.

ISSUED BY THE IMPERIAL COMMISSIONER OF AGRICULTURE.

1931.

[Price Sixpence.]

PRINTED AT THE BULLETIN OFFICE, ROSEAU, DOMINICA, B.W.I.

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REPORT ON THE AGRICULTURAL DEPARTMENT, DOMINICA.

FOR THE YEAR ENDED 31ST MARCH, 1930.

WORK IN THE GARDENS AND OBSERVATIONS ON PLANTS.

THE usual routine work of the Botanical Gardens was carried on and the following improvements effected.

Two beds were made in the vicinity of the main lawn, one was planted with *Clerodendron Ugandense*, and the other with *Poinsettia* (*Euphorbia Pulcherrima*.)

Two beds bordering the cricket lawn were replanted, one with *Acalypha* *Sp.* and the other with *Thunbergia Erecta*.

A small addition to the maintenance vote enabled an order to be sent for zinc labels for specimens planted during recent years and the replacement of those labels lost or defaced.

The cricket pitch was extended and drained. The plot formerly occupied by nutmegs and destroyed by the hurricane of 1928 was replanted with citrus and interplanted with coffee.

The species and varieties represented are :—

<i>Citrus.</i>	<i>Coffee.</i>
King Mandarin	San Ramon
Jaffa Orange	Stenophylla
Boon's Early Orange	Uganda
Valencia Orange	Mocha
Tangerine	Excelsa

Plants of the Blue Mountain variety of *Coffea Arabica* received from the Agricultural Department of St. Lucia were planted in another plot.

The following interesting specimens flowered or fruited for the first time.

A tree 30 ft. high of *Lucuma Nervosa*, grown from seed received in 1922 from Florida, where it is known as the "Egg Fruit," produced a few fruits. These were oval in shape and about 3½ inches in length.

The report for 1926-27 records the flowering of *Hydnocarpus Kurzii*, in which year no fruit was set. The "compact growing form" bore a few fruits this year. Seeds from the mature fruits were sown but failed to germinate. Despite the damage received during the hurricane of 1928 the *Hydnocarpus* collection is making rapid and healthy growth, especially the plot of *Hydnocarpus Wightiana* which though only planted in February, 1928, has commenced to flower.

Plants of the dwarf coconut (*Cocos Nucifera*) received from the Federated Malay States in 1923 have commenced to fruit.

The year was unusually wet, the rainfall for 1929 was 96.98 exceeding the average by over 20 inches.

WORK IN THE NURSERIES AND DISTRIBUTION OF PLANTS.

The past year witnessed large extensions of existing citrus nurseries and also the formation of new ones.

His Honour the Administrator placed a part of Government House grounds at the disposal of the Department for use as a nursery. Clearance of this land was commenced in June followed by the planting of about 10,000 sour orange stocks.

For the purpose of supplying the Northern and Eastern districts, and to surmount the difficulty of transport from Roseau, a nursery was started on the old military lands at the Cabrits, Portsmouth. Stocks of Sour Orange, Lemon, and Grapefruit were planted, from which it is expected to supply 2,400 budded lime plants during the coming planting season.

WORK IN THE NURSERIES.—PLANT DISTRIBUTION.

The five acre nursery at Copt Hall proved successful for the growing on to the planting-out size of over 50,000 sour orange stocks, numbers of which were distributed to estates for private nurseries. Frequent precipitation made this nursery an admirable one for growing on the young plants, and although situated in a withertip area it was found possible during the dry months of February and March to bud the West Indian lime successfully. The nursery, however, is primarily used for the propagation of citrus not infected by withertip such as Lemons, Grapefruit, Oranges and Mandarins etc., while the nurseries in the vicinity of the Botanic Gardens and virtually out of the withertip area are devoted to the propagation of the lime.

The time taken from the planting out of stock to the sending out of a well developed budded plant makes economy of nursery space and the continual opening up of new land imperative in order to cope with the large and increasing demand for this type of plant.

For a tropical citrus nursery to maintain its fertility and cleanliness, a period of rest under a good cover crop, is necessary to destroy those weeds difficult of eradication during its occupation by nursery stock, and to provide green manure as a source of humus.

While grafting by approach has enabled the Department to have plants ready for distribution quicker than by budding, the latter method is the one now generally employed. The budding operation is more quickly performed, the main advantage being that the bud is taken from the parent tree of known productivity, whereas the seedling graft is to a certain extent an unknown quantity.

Two plots, one of budded and the other of grafted limes, have been planted out side by side in the Lime Experiment Station, to ascertain the comparative future influence of these methods.

To assist with the large amount of budding during the early months of the year, two budders were kindly lent by the Trinidad Department of Agriculture. The number of pupils has been increased and with other men, trained as budders, this work is kept well in hand. Reports received from the many estates to whom budders have been lent, testify to the proficiency and type of boy trained by the Department.

The greatly reduced price charged for plants propagated asexually calls for careful regulation of the number of plants supplied to individual planters.

With limes, especially, locality has to be taken into consideration and the future treatment of these carefully raised plants is a main point governing the discretion of the Department in its distribution. There is a tendency for some growers to order and take plants on the lines formerly associated with the establishment of the seedling lime, when plant wastage was of small account and the number of plants which could be crowded to the acre was the chief consideration. The true economy is to plant the correct number of trees, plant them firmly in large and well prepared holes, water and shade them should a dry spell follow planting, then mulch and attend them at frequent intervals. The nominal charge made for budded plants ensures to some extent that the above simple, practical and essential details are carried out.

These subsidised plants likewise appeal to some persons who are not disposed to take the fairplay viewpoint of their neighbours' needs. Such tendencies are controlled, and will disappear when it is realised that the Department is in a position to meet all orders for budded plants for the ensuing planting season.

A steady demand continues for Oranges, Lemons, Grapefruit and Grafted Mangoes, showing that propaganda for encouraging and developing the fruit trade has been effective. The supply of these plants has been treated as secondary to the furnishing of budded limes, but it is expected to supply all orders for the former in the near future.

All orders for Nutmegs, Cocoa, Coffee and Coconuts were met, the plants being of good size and quality. Plants supplied since 1927 (as shown in the following lists) make an imposing total and the Department's efforts in this connection should soon be bearing fruit.

The expenditure during the year on nursery work and distribution of plants, amounted to one thousand two hundred pounds (£1,200). This amount is provided for, from funds granted by the Imperial Government, towards the amelioration of Agricultural conditions in Dominica.

PLANT IMPORTATIONS.

PLANT DISTRIBUTION.

TABLE I.

Name of Plant.	Total for 1927.	Total for 1928.	Total for 1929.
Washington Navel Orange	1,184	860	768
Budded Oranges (other)	—	—	—
Grapefruit	1,280	1,529	759
Portugal Orange	46	22	22
Mandarin	23	16	7
Sweet Lime	20	12	6
Tangerine	37	14	12
Seedling Limes	31,610	8,310	300
Budded & Graft W. I. Limes	—	1,117	6,182
Limes (Other Varieties)	1,406	1,916	953
Lemon	—	838	213
Coconuts	10,195	12,738	7,489
Cocoa	7,860	11,866	12,865
Coffee	22,114	30,965	48,037
Grafted Mangoes	194	205	288
Seedling Mangoes	20	54	18
Nutmeg	4,901	1,555	1,995
Tobacco	4,800	1,482	—
Mangosteen	248	33	71
Sour Orange	1,275	2,012	8,600
Papaw	514	1,396	284
Tannias	2,624	6,434	16,362
Camphor	313	50	—
Black Pepper	448	96	—
Onions	9,100	4,500	—
Sugar Cane Cuttings	—	—	26,643
Miscellaneous	5,908	967	6,076
	106,120	88,487	137,950

PLANT IMPORTATIONS.

Plants introduced during the year and successfully raised were as follows ;—

Carica Papaya Vars., *Crotolaria* Spp., *Cajanus Indicus* Var., *Sugar Cane* Var. B.H. 10/12, B. 726 & S.C. 12/4, *Persea Gratissima* Vars. Morne, La Perle, Union Vale, *Clerodendron* Sp., *Myristica Fragrans*, *Aleurites Montana*, *Sapium Sebiferum*, *Mucuna Utilis*, *Vigna Catyang*, *Calapogonium Mucunoides*, *Eucalyptus Tereticornis*, *Tephrosia Candida*, *Coffea Arabica* Var. Blue Mountain, *Pinus* Spp., *Mimosa* Sp., *Solanum Sanitwongsei*, *Phytelphas Macrocarpa*.

In addition, 49 species of seeds from the Harvard Botanical Gardens, Cuba, and numerous pot plants, cuttings and seeds from the Royal Gardens, Trinidad, form a welcome addition to the present collection. They were mainly ornamental, but included a number of useful economic plants and several palms not already represented in Dominica. The germination of the seeds has been on the whole satisfactory. The most noteworthy in these two collections were *Solanum Wendlandii*, *Rubus idoeus*, *Hydnocarpus ilicifolia*, *Persea gratissima* vars. Pollock and Rudder, *Benincasa cerifera*, *Aristolochia elegans*, *Diospyros Texana*.

Five hundred buds of Foster's Grapefruit were received from Trinidad. This is a popular pink-fleshed variety, and practically the only variety of marketable note not previously included in the Department's collection. Most of the buds have "taken."

LIME EXPERIMENTS.

WORK CONNECTED WITH INSECT AND FUNGUS PESTS
AND THEIR CONTROL.

Red root disease (*Sphærostilbe repens*) continues to play havoc with lime cultivations and the number of dead and dying trees increases daily. During the year the disease reached the Lasoye district where it was hitherto unrecorded. Full accounts of earlier mycological investigations have already appeared in previous reports and no useful purpose will be served by repetition, as it is now recognised that the only practical method of control is the use of resistant stocks on which the lime should be budded or grafted. It has been stated that hurricanes and root grubs are pre-disposing factors, the damage caused providing an opening for infection. In the Department's nurseries, however, seedling limes which have been grown for grafting purposes, have succumbed at a very early age to root disease. Whether this disease is the same as the one generally affecting all seedling lime cultivations is not definitely known, although locally it is so considered. Should this be so, it would point to some other primary trouble, for these plants had not been affected by hurricane or grub attack. This appears to be borne out by the experience of a prominent local planter who, by way of experiment, planted healthy young seedling limes and sour oranges on the very spot from which diseased trees had been removed. His main idea was to re-establish a field quickly by approach-grafting the two seedlings. Within a short time, and before grafting could be attempted, all the lime seedlings died, but the sour orange persisted and appeared to thrive.

"Witch's Broom" of lime. A single case of this disease was observed during the year on a bearing lime tree. The hard, woody enlargements of the nodes, and hypertrophy of the buds giving rise to "Witch's Broom" were probably caused by *Sphæropsis tumefaciens*. This fungus is believed to be fairly common in Jamaica, but not in Dominica. The affected limbs should be removed well below the disease area, and badly diseased trees dug out altogether, care being taken to burn all diseased material as the fungus is capable of remaining dormant in the galls for long periods.

Citrus Scab. This disease has caused considerable trouble in the sour orange nurseries of the Department, causing ugly-looking raised corky excrescences on the leaves and at the nodes of the young plants, especially after prolonged wet weather. Repeated spraying with Bordeaux Mixture 5-5-50, kept the disease under control. Rough lemon stocks were slightly affected, and grapefruit stocks appeared to be quite resistant.

Withertip. The Withertip and Blossom Blight disease continues to take its yearly toll of lime blossoms and young shoots. Fairly dry weather during the flowering period enabled a fair crop to be set.

Root Grubs. Root Grubs have shown a marked preference for young sour orange plants grown as stocks for budding purposes, and a fairly severe attack was experienced at one of the Department's nurseries. Several planters have reported losses of young budded trees after being planted in the field, but the losses in most cases have not assumed alarming proportions. The grubs have been identified as larvae of species of *Exophthalmus*, *Lachnosteria*, and *Diaprepes* popularly termed "citrus beetles," "hardback" and "root borer" of sugar cane. The most satisfactory method of control was found to be hand-picking the adults during time of prevalence, women with torches doing the work between dusk and 10 p.m. at which hours the beetles are most readily found. Specimens of these beetles were submitted to the Imperial College of Tropical Agriculture and identified as a species of the genus *Exophthalmus*, probably *E. esuriens*.

REPORT ON THE LIME EXPERIMENT STATION, DOMINICA.

In last year's report announcement was made of the discontinuance of the keeping of crop records in connection with the manurial experiments with seedling limes. This decision was forced, owing to the depletion of the plots by the rapid spread of root disease and the devastating effect of the hurricane of 1928.

The seedling lime trees are gradually dying out, but those still existing are bearing a remarkably heavy crop which during the year produced a revenue of over £1,022. It was chiefly for this reason, and also on account of the general shortage of limes, that it was decided to maintain the bearing trees, and not resort to wholesale clearing for the purpose of expediting the lay-out of a new series of experiments. Those plots which have been completely destroyed have since been replanted with leguminous cover crops, to tone up soil

LIME EXPERIMENTS.

conditions, and repress weeds before commencing a new series of experiments with budded limes.

In sharp contrast stand the five plots of limes budded on sour orange stock. Two, located on a gentle slope having a fairly deep soil and planted in 1913, have made a much more vigorous growth than seedlings planted at the same time and under the same conditions. Furthermore, this greater growth has been compatible with proportionately heavier yields.

Three plots planted to replace seedling trees destroyed by the hurricane of 1916 are on a relatively steep slope with a meagre soil depth. Even here the growth has been superior to that of the seedling tree, and the plots have passed through all the vicissitudes of the seedling lime without the loss of a single tree.

It should nevertheless be pointed out that the soil on much of the station is too shallow for the full development of the trees on sour orange stock, and it is unlikely that more than half of the original area under seedling limes can be replanted.

Experiments will be made to discover the type of stock most suitable for the shallower soils and the minimum depth of soil necessary to cultivate limes on such stocks.

It is intended during the coming year to plant a triplicate series of plots to include limes budded on sour orange, lemon and grapefruit stocks. The use of *Citrus hystrix* as a stock has been abandoned owing to its susceptibility to foot rot. Two full-grown trees of this species succumbed to this disease during the year. It is worth recording that limes budded on this stock developed with remarkable vigour until later killed by disease.

During 1928 a plot of nearly one acre of uncultivated sloping land, between the main road and the ravine, was brought into cultivation and planted during the following year. One half has been planted with budded limes and the other half with grafted limes. The object of this experiment is to observe what differences, if any, exist in the bearing capacities between the two methods of propagation as applied to the West Indian lime, for as hitherto mentioned, the Department has been compelled during prolonged wet periods to resort to grafting seedlings by approach in order to cope with the unprecedented demand for limes budded on sour orange. There is no local experience of any kind, with regard to the behaviour of the grafted plant, and this experiment should in a short time render valuable information in this respect. So far no differences in vigour of growth is to be observed between the grafted and budded limes planted in the Department's trial grounds.

The two grapefruit plots continue to bear heavily and produce fruit of fine quality. Samples of all the varieties grown were exhibited at the Imperial Fruit Show, Birmingham, and were favourably commented on.

The plot of avocado pears has made slow recovery from the effects of the 1928 hurricane. This trial has demonstrated that this tree is quite unsuited to an exposed, steep, hillside situation with a shallow soil.

Before replanting the vacant areas with budded limes, the first thought must be given to the improvement of soil conditions. It has to be borne in mind that (1) the land has been under an exhaustive orchard crop for many years, (2) root diseases have shown themselves to be particularly active, aided by the influence of the binding qualities of Dominica soils tending to acidity and air exclusion, and (3) the multiplication of the worst types of weeds. To give the land a period of rest, or better still to put it under a short crop such as cane, is possibly the ideal cultural course to pursue, though not practical where time or finance is the primary consideration. Another point, the seedling lime is a surface rooter, whereas the sour orange stock by which it is to be replanted has a deeper ranging root system.

The intention is to fork the land, follow this with a thick sowing of the horse bean (*Canavalia ensiformis*). This will prevent soil washing and provide an efficient weed smotherer and green dressing. As an additional cover the beans will be followed by sowings of *Tephrosia candida* or Pigeon Peas. Interplanting with Lemon grass, Elephant grass, and Uba cane for providing mulch will also be tried in order to ascertain the cheapest and best method of caring for the lime tree from the planting out to the fruiting stage.

COCOA EXPERIMENTS.

COCOA EXPERIMENTS.

The old series of manurial experiments discontinued in 1922 were put under a different series in the same year, the new treatment being based on the information supplied by the earlier results. The latter strongly confirmed the belief that the use of complete fertilizers with mulches or pen manure is the basis of economic practice in successful cocoa production. The present series, of which the details of treatment and yields are given below, were laid down with a view of attempting to ascertain the relative requirements of cocoa in respect of nitrogen, phosphates, potash and humus, and the forms in which these elements may be best supplied in Dominica.

The use of mulch has been amply vindicated. For the series under review, this material is easily and cheaply obtainable from the sweeping of leaves from trees in the Botanical Gardens, with a large proportion of pods of the Samon trees round the cricket pitch, which are relatively more nitrogenous (vide annual report 1915-16, p. 28). This practice is a part of the regular routine work of the maintenance of the Gardens which does not, therefore, constitute any charge on the cultivation of the cocoa plots.

The Department has advocated mulching for many years, but while it is true that some planters have adopted the method in lime cultivations, there seems to be an idea prevalent that on account of the carpet of its own leaves under the cocoa tree, there is little to be gained by mulching this crop.

The plots are in two main groups. Plots I—VII are on comparatively flat land, while Plots VIII—X are on hillsides. In the first group, however, three sub-groups with smaller divergence of soil and situation exist and are therefore comparable. The grouping is indicated by the horizontal lines in table II. Of the seven plots on the flat, plots one and five receiving respectively artificals and mulch alone, may serve as a basis of comparison with the other plots in the same group, which received varying combinations of both.

MANURIAL EXPERIMENTS WITH COCOA.

The following table shows the area of each plot, treatment per plot, and treatment per acre.

<i>Plot No.</i>	<i>Area, Acres.</i>	<i>Treatment per plot.</i>	<i>Treatment per acre.</i>
1.	0.29	261 lb. Mixed fertilizer 8-10-4. Without mulch.	900 lb. Mixed fertilizer 8-10-4.
2.	0.36	162 lb. Nitrapo, 200 lb. Acid phosphate.	450 lb. Nitrapo, 555½ lb. Acid phosphate.
3.	0.28	126 lbs. Nitrapo, 157 lb. Acid phosphate, 1,568 lb. Mulch.	450 lb. Nitrapo, 560¾ lb. Acid phosphate, 2½ tons Mulch.
4.	0.37	4,144 lb. Mulch.	5 tons Mulch.
5.	0.29	261 lb. Mixed fertilizer 8-10-4 3,248 lb. Mulch	900 lb. Mixed fertilizer 8-10-4 5 tons Mulch.
6.	0.25	75 lb. Nitrapo, 118 lb. Acid phosphate, 1,400 lb. Mulch.	300 lb. Nitrapo, 472 lb. Acid phosphate, 2½ tons Mulch.
7.	0.25	150 lb. Cotton seed meal, 118 lb. Acid phosphate, 25 lb. Potash.	600 lb. Cotton seed meal, 472 lb. Acid phosphate. 100 lb. Potash.
8.	0.414	248½ lb. Mixed fertilizer 8-10-4	600 lb. Mixed fertilizer 8-10-4
9.	0.373	223 lb. Mixed fertilizer 8-10-4 4,177 lb. Mulch.	400 lb. Mixed fertilizer 8-10-4 5 tons Mulch.
10.	0.40	160 lb. Mixed fertilizer 8-10-4 200 lb. Lime, 1 ton Mulch.	400 lb. Mixed fertilizer 8-10-4 500 lb. Lime, 2½ tons Mulch.

COCOA EXPERIMENTS.

The following tables show the yields in each of the eight years since the new series was commenced. The yields are given in terms of pounds of wet cocoa per plot and per acre, and cured pounds per acre. An average of 38 lb. cured cocoa was obtained from 100 lb. wet cocoa.

Year.	Plot 1.		Plot 2.		Plot 3.		Plot 4.		Plot 5.	
	261 lb. Mixed Fertilizer (8-10-4) No Mulch.		162 lb. Nitrapo, 200 lb. Super Phosphate.		126 lb. Nitrapo, 157 lb. Super Phosphate. 1,569 lb. Mulch.		4,144 lb. Mulch.		261 lb. Mixed Fertilizer. (8-10-4) 3,248 lb. Mulch	
	per plot.	per acre.	per plot.	per acre.	per plot.	per acre.	per plot.	per acre.	per plot.	per acre.
1922-23										
Wet Cocoa	1,010	3,514	1,014	2,816½	663	2,368	1,240	3,351	1,096	3,779
Cured		1,370		1,098		1,028		1,306		1,473
1923-24										
Wet Cocoa	1,322	4,558	1,152	3,200	936	3,343	1,309	3,510	1,234	4,255½
Cured		1,776		1,248		1,303		1,368		1,659
1924-25										
Wet Cocoa	1,188	4,096	1,023	2,841½	797	2,846	1,236	3,340½	1,035	3,569
Cured		1,597		1,107		1,109		1,302		1,331
1925-26										
Wet Cocoa	1,018	3,510	769	2,136	583	2,682	1,006	2,718	855	2,878
Cured		1,333		811		791		1,032		1,093
1926-27										
Wet Cocoa	1,028	3,544	1,032	2,866	781	2,789	842	2,275	1,002	3,489
Cured		1,346		1,089		1,059		864½		1,325
1927-28										
Wet Cocoa	807½	2,784	968	2,888	1,178½	4,208	1,169	3,159	926	3,193
Cured		1,057		1,097		1,599		1,200		1,211
1928-29										
Wet Cocoa	971	3,348	1,025	2,847	718	2,564	625	1 689	605	2,086
Cured	369	1,273	389	1,081	273	975	237	640	230	793½
1929-30										
Wet Cocoa	874	3,014	1,079	2,969	600	2,143	782	2,113½	442	1,524
Cured	331½	1,143	394	1,095	228	814	298	805½	168	579

COCOA EXPERIMENTS.

Year.	Plot 6. 75 lb. Nitrapo. 118 lb. Surperphos. 1,400 lb. Mulch.		Plot 7. 150 lb. Cotton Seed Meal 118 lb. Super Phosphate.		Plot 8. 248 lb. Mixed fertilizer. (8-10-4.)		Plot 9. 223 lb. Mixed fertilizer (8-10-4) 4,177 lb. Mulch.		Plot 10. 160 lb. Mixed fertilizer 200 lb. Lime 1 Ton Mulch.	
	per plot.	per acre.	per plot.	per acre.	per plot.	per acre.	per plot.	per acre.	per plot.	per acre.
1922-23 Wet Cocoa.	918	3,672	754	3,016	650	1,570	1,177	3,155½	961	2,402½
Cured		1,432		1,176		612		1,230		936
1923-24 Wet Cocoa.	986	3,944	902	3,608	745	1,799½	1,049	2,789½	1,005	2,512½
Cured		1,538		1,407		701		1,087		979
1924-25 Wet Cocoa.	886	3,544	610	2,240	736	1,777¾	1,138	3,051	867	2,167½
Cured		1,382		873		693		1,189		845
1925-26 Wet Cocoa.	819	3,276	500	2,000	830	2,004	1,259	3,378	801	2,002
Cured		1,244		760		761		1,283		760
1926-27 Wet Cocoa.	822	3,288	659	2,636	777	1,877	1,259	3,375	922	2,305
Cured		1,249		1,001		711		1,282½		875
1927-28 Wet Cocoa.	719	2,876	490	1,960	610½	1,474	1,861	4,989	797½	1,993
Cured		1,092		744		560		1,895		757
1928-29 Wet Cocoa.	578	2,312	441	1,764	514	1,241½	1,015	2,727	510	1,275
Cured	216½	866	167½	670	195	471	386	1,035	154	385
1929-30 Wet Cocoa.	724	2,896	641	2,564	700	1,691	882	2,364½	295	737½
Cured	275	1,100	233½	934	266	642½	335	898½	112	280

THE AGRICULTURAL AND INDUSTRIAL EXHIBITION.

THE AGRICULTURAL AND INDUSTRIAL EXHIBITION.

After a lapse of twenty-three years an Agricultural and Industrial Exhibition was held on the 6th of March, 1930, in the St. Gerard's Hall, Roseau, by the kind permission of the Dean of Roseau.

The Agricultural Superintendent was Chairman of the Committee responsible for the arrangements.

The Exhibition was very successful and was well attended. Exhibits numbered nearly 1,300 and were on the whole satisfactory. Vegetables formed the largest display and a high standard was attained. Collections of vegetables grown in school gardens were particularly good.

It was the off season for fruit, but the small quantity exhibited was attractive.

Farinaceous products were good and plentiful, and coffee, cocoa, nutmegs, vanilla, coconuts, limes, and their products were commendable in quality. Live stock was but poorly represented and was decidedly below standard. Most of the exhibits were sent on by small growers, who took a particularly keen interest in the Exhibition.

During the Exhibition the Agricultural Department gave practical demonstrations in budding and grafting.

AGRICULTURAL LOAN BOARD.

The Loan Board functioned as usual throughout the year and continued to give financial assistance to a considerable number of estates. This assistance, in the form of long term loans at a low rate of interest is appreciated by the recipients, and has been instrumental in effecting improvements to existing cultivations, as well as extending the area under new plantings of permanent crops.

The hurricane of 1928, however, was a serious set-back to progress, owing to the extensive damage and loss to cultivations. Set-backs to the planter are all too frequent in Dominica and naturally place a heavier burden on the man who is striving to make good and free his estate of encumbrance.

The Senior Officers of the Department continued to inspect and report to the Board on the allocations of loans made, and the progress made by their application.

GOMIER STEWART ESTATE.

There are now 24 tenants on this Estate renting 28 plots of land. During the year one tenant was given notice to quit, and another relinquished his holding.

The rapid spread of red root disease has destroyed most of the lime trees and in consequence the Department obtained for the tenants a reduction of rental to the minimum rate of 10/- per acre per year. Further assistance was rendered by supplying them with budded citrus free of charge.

Periodical visits are made by Officers of the Department for the purpose of giving advice and assistance.

DETAILS OF ADMINISTRATION.

DETAILS OF ADMINISTRATION.

EXPENDITURE.

The local votes for the Agricultural Department for the year were as follows:—

	£	s.	d.
Salaries Curator, Assistant Agricultural } Officers, Clerk, Foreman and Watchman }	1,233	0	0
Contingencies	13	0	0
Travelling Expenses	100	0	0
Maintenance	300	0	0
Cultivation Saleable Products & Minor Industries ...	300	0	0
Purchase Special Manures	100	0	0
Printing Reports etc.	40	0	0
Experiment Station	370	0	0
Chemicals and Apparatus... ..	25	0	0
Telephone Rental	25	0	0
Upkeep of Horses and Mules	30	0	0
Agricultural Instruction	322	0	0
	£2,858	0	0

The actual expenditure during the year under the above heads was £2,500. 7. 6.

IMPERIAL GRANTS IN AID.

Expenditure for propagation and distribution of economic plants £1,200.

RECEIPTS.

	£	s.	d.
Limes	1,022	2	3½
Cocoa	108	16	2
Plants	117	2	2
Fruit	68	14	6
Nutmegs	2	16	1
Coconuts	11	4	5
Onion Seed	18	2	0
Vegetable Seed	8	5	6
Tobacco Seed	1	10	0
Tobacco	—	—	—
Miscellaneous	9	10	5
Laboratory Receipts	27	12	6
	£1,395	16	0½

STAFF CHANGES.

A re-organisation and regrading scheme originating from the Colonial Office has changed the titles of the Assistant Curators to that of Assistant Agricultural Officers. Mr. F. L. Squibbs, Assistant Curator, was appointed with seniority as Assistant Agricultural Officer. Mr. H. B. Pidduck, N.D.D., N.D.A., late Headmaster of the Dominica Grammar School, was appointed Assistant Agricultural Officer on the 1st August, 1929.

Mr. F. L. Squibbs proceeded on six months vacation leave on the 2nd September and Mr. V.G. Pereira from Antigua was temporarily appointed to assist the Department during the former's absence. Hon. J. C. Macintyre, M.B.E., Peasants' Adviser, was appointed Government Trade Agent on the 1st October, 1929, and took charge of the Fruit Packing Dépôt. Mr. G. A. Winston was appointed Clerk to the Peasants' Adviser and Government Trade Agent on the 1st June, 1929.

REPAIRS TO BUILDINGS, ETC.

Minor repairs were carried out to the Department's buildings, gates, etc. as required.

DETAILS OF ADMINISTRATION.

CORRESPONDENCE AND DISTRIBUTION OF INFORMATION ON
AGRICULTURAL MATTERS.

Five hundred and thirty letters were despatched from the Department's Office not including over 350 bills. The number of Minute Papers dealt with, excluding numerous Confidential and Loan Board Minute Papers, was three hundred and seventy-three. The office work of the Department has increased to such an extent that much valuable time of the Senior Officers of the Department is utilised to cope with it.

Various pamphlets and copies of reports were distributed to planters interested.

PLANT AND SEED EXCHANGE.

Contributions of seeds and plants were received from the following :—

Departments of Agriculture viz :—Trinidad, Antigua, St. Lucia, Barbados, Porto Rico, Montserrat, Director Royal Botanic Gardens Kew, Superintendent of Agriculture Antigua, Imperial Commissioner of Agriculture, Trinidad, Australian Department of Agriculture Canberra, Harvard Botanical Gardens Cuba, College of Pharmacy University of Florida, R.E.A. Nicholls, Esq. Dominica.

Seeds and plants were sent to :—

Departments of Agriculture viz :—Montserrat, St. Vincent, Antigua, Guadeloupe, Demerara, Barbados, Trinidad, St. Lucia, also Harvard Botanical Gardens Cuba, Royal Botanic Gardens Kew, Estacion Experimental Agronomica. Cuba, Transvaal University College Pretoria, Cousine Frères, French Guiana, and Vilmorin Andrieux Co., Paris.

OFFICIAL VISITS TO THE DEPARTMENT, ETC.

Among the visitors to the Department during the year under report were :—

His Excellency Lt.-Col T.R. St. Johnston, C.M.G., Governor of the Leeward Islands ; Prof. H.A. Ballou, M.Sc., Commissioner of Agriculture ; Mr. G.A. Jones, Assistant Commissioner of Agriculture ; Dr. Thomas Barbour of Harvard University, U.S.A. ; Prof. J.S. Dash, Director of Agriculture, Demerara ; Mr. E.A. McCallan, Director of Agriculture, Bermuda ; Mr. F.H.S. Warneford, B.A., F.I.C., Assistant Government Chemist Leeward Islands, and Prof. J.A. Todd of the Liverpool Cotton Service.

VISITS TO ESTATES & AGRICULTURAL INSTRUCTION.

VISITS TO ESTATES.

Frequent visits were made by the Senior Officers of the Department to estates and outlying districts. The Loan Board is interested in 40 estates, 16 of which are over a hundred acres in extent and at least two visits per year to each property for the purpose of inspection and report are called for. The above number does not include numerous properties inspected, on which no advances are made. These visits of inspection serve a useful purpose, in keeping the Department in contact with planters.

The usual visits were paid to estates not financed by the Loan Board for the purpose of giving advice and information.

The largest number of estates visited in any one month during the year, was fourteen (14) during the month of July.

AGRICULTURAL INSTRUCTION.

The following districts were visited by the Travelling Agricultural Instructor :

APRIL.	Portsmouth, Grandbay, Rosalie and Roseau.
MAY.	Castle Bruce, La Roche, Grand Fond and La Plaine.
JUNE.	Portsmouth and Colihaut.
JULY.	Portsmouth, Marigot, Carib Quarters, Castle Bruce and Rosalie.
AUGUST.	Portsmouth, Vieille Case, Tit Bay, Colihaut and Cabrits.
SEPTEMBER.	Portsmouth, Zicack, Borne, Newfoundland and Vieille Case.
OCTOBER.	Vieille Case, Crapaud Valley, Thiland and Portsmouth.
NOVEMBER.	Marigot, Hampstead and Portsmouth.
DECEMBER.	Portsmouth, Clifton, Cottage and Capuchin.
JANUARY.	Portsmouth, Borne and Gillette.
FEBRUARY.	Marigot and Dos d'Âne.
MARCH.	Portsmouth, Colihaut, Du Blanc, Toucarie and Capuchin.

LABORATORY WORK.

For the past few years, six pupils have been trained over a course of two years by the Department, with the Senior Pupil as Assistant Instructor and Pupils' Overseer. This year, owing to the increased demand for budders, however, their number has been permanently increased by four with four additional temporary appointments. So keen is the competition for these pupilships, which are awarded as the result of periodical examinations, that in response to a notice in the *Official Gazette* and local papers no less than 21 candidates made application. The four selected were :—

Garford Shillingford	Roseau Boys' School,
Whyam Sorhaindo	Delices School.
Phillip Casimir	Grand Bay School.
Benoit John Baptiste	Delices School.

Their training consists of outdoor work of all kinds, special attention being given to proficiency in budding, grafting and propagation generally. The pupils are largely drawn upon by planters for their nursery work and as assistant overseers on the larger estates, while, in the case of the smaller nurseries, pupils are loaned for budding and grafting. Some thousands of budded and grafted plants have been produced in this manner in addition to those distributed from the Department's nurseries. Besides nursery work, including spraying operations necessary throughout the year, the pupils assist with the recording of experimental details, application of manures, pruning, gathering and marketing crops. The Senior Pupils are at times placed in charge of gangs during the temporary absence of overseers and are responsible for time-keeping, making out pay-lists, and keeping diaries of work accomplished.

Class work is restricted to lectures and study on Saturday mornings and is not of an advanced nature, the object being to correlate as simply as possible the principles underlying field and nursery work with the practical work performed. The Syllabus may be summarised thus :—

(a) AGRICULTURAL CHEMISTRY & BOTANY.

Relationships between the Atmosphere, the Soil and the Plant. Catch crops. Germination and the functions of plant organs. The flower and pollination. Fruit dispersal and seed selection.

(b) PESTS AND DISEASES.

The characteristics and life history of fungi and insects and their natural enemies and artificial control.

(c) CROPS.

Propagation, preparation, planting, tending, harvesting and marketing, including the preparation of bye-products, of the chief crops of Dominica, for both export and local consumption.

The Staff thanks planters for their kind hospitality during visits to the country districts. Such kindness is welcome under the often trying climatic conditions and difficulties of travelling in Dominica.

LABORATORY WORK.

The routine work in the laboratory consists chiefly in the testing of lime juice (raw and concentrated) for acidity, and of samples of bay oil for phenol content. A small fee is charged for each test made.

The following tests were made during the year :—

Raw lime juice	35
Concentrated lime juice	22
Bay Oil	323

Since the appointment of Mr. H. B. Pidduck to the staff of the Department, the analysis of milk has again been undertaken. Mr. Pidduck was appointed Government Milk Analyst in 1924, a fee of 2/6 being charged for each sample. The following brief report for 1929-30 summarises the milk situation in Roseau and the surrounding districts :—

THE LIME INDUSTRY.

MILK SUMMARY.

<i>Analysed.</i>	<i>Locality.</i>	<i>Genuine.</i>	<i>Adulterated.</i>	<i>Deficient.</i>	<i>Doubtful.</i>
Sept. 6 1	Roseau	—	1	—	—
Nov. 26 1	„	—	1	—	—
Oct. 9 4	Soufriere	2	2	—	—
Jan. 20 1	Mahaut	—	1	—	—
„ 31 6	Waten Waven etc.	5	—	—	1
Mar. 9 1	Roseau	—	1	—	—
„ 10 1	„	—	—	1	—
15		7	6	1	1

The minimum standard required by Law in Dominica is 3% of milk fat, and 8.5% of milk solids other than milk fat.

The adulteration consisted in the addition of water estimated as 36%, 5%, 9.5%, 4% 14% and 7% respectively; average 12.6%. Thus only 50% of the samples submitted were genuine—a most unsatisfactory state of affairs, mitigated somewhat by the fact that most of the adulterated samples were suspect, and that 5 of the 7 genuine samples were taken at random.

A number of samples were badly contaminated with dirt and were probably quite unsafe for infant, if not, for adult consumption.

THE LIME INDUSTRY.

The export figures for limes and lime products show a falling off of 72,000 barrels when estimated as fruit. This decrease is attributable to the devastating effects of root disease and the hurricane of 1928.

There was considerable local competition for the purchase of lime products and prices were phenomenally high throughout the year. The closing prices for December 1929 were Ripe Limes 12/- per barrel, Green Limes 20/- per barrel, Essential Oil 55/- per lb. and Distilled Oil 27/- per lb.

The following table which gives the crop shipped in each year from 1920, is calculated in barrels of fruit and expressed in round numbers.

<i>Year.</i>	<i>Barrels.</i>	
1920	369,000	Prior to appearance of Withertip.
1921	516,000	
1922	400,000	
1923	228,000	
1924	424,000	Includes carry-over from 1923.
1925	230,000	
1926	214,000	
1927	210,000	
1928	205,000	
1929	133,000	

The following table calculated on the usual basis shows the disposal of the crop under various heads.

<i>Products.</i>	<i>Barrels of Fruit.</i>	<i>Approximate percentage of total crop.</i>
Concentrated lime juice..	53,169	39.87
Raw juice	63,347	47.50
Fresh limes	16,658	12.50
Pickled limes	67	.05
Lime juice cordial ..	110	.08

<i>Products.</i>	<i>Quantity.</i>	<i>Value.</i> £
Concentrated lime juice..	35,446 gallons	8,124
Raw lime juice	475,102 „	42,007
Lime juice cordial ...	20 „	5
Fresh limes	16,658 barrels	23,986
Pickled limes	67 „	141
Essential oil (distilled)...	30,804 lbs.	41,526
Otto of limes (hand-pressed or ecuelled)..	5,256 „	17,168
		£132,957

Withertip disease was first observed early in 1922 and spread so rapidly that by the end of that year very few if any lime cultivations were unaffected. Although the crop for 1924 was inflated by a large carry over, principally of concentrated lime juice from 1923, it will be observed that the reduction mainly attributable to withertip was in the neighbourhood of 40 to 50% of normal crop. In 1926 a hurricane was responsible for severe damage to plantations and also, according to leading mycological authorities, to the attack of Red Root disease which began at the end of that year. Efforts to control this disease have proved of no avail, and it has continued to play havoc with the cultivations. Another hurricane was experienced in 1928 which was of greater intensity than the one in 1926. The remaining lime cultivations were very badly battered and thousands of trees destroyed. The loosening and twisting of the roots of lime trees set up conditions peculiarly favourable to the spread of root disease. So rapidly did the disease spread that it soon became evident that it had spelt the doom of the seedling lime in Dominica. Exports of lime products will fall to a very low ebb and no improvement can be looked for until recent plantings of the lime grafted or budded on disease and hurricane resistant stock come into bearing. Dominica must of necessity begin all over again to build up its lime industry.

In the past, seedling limes have been planted much too closely with no definite method of planting being employed, except in a very few instances. The planter has now the op-

THE LIME INDUSTRY.

portunity of profiting by his past experience and laying out his fields on approved lines. The question of the correct distance to plant is always a controversial one, but guided by the development of budded trees growing in the Department's Experiment Station and which were planted in 1913, a distance of 25' by 25' should be about right for trees planted on the flat where the soil is good, and 20' by 20' on gentle hill slopes. There are various systems of planting, but the one most commonly used is the square, the rows of trees intersecting each other at right angles. The triangular and the hexagonal systems are also employed by some citrus growers. In the former case the trees in the second row are set midway between the trees in the first row, and in the latter the trees are planted equidistant from each other. The following table sets out the number of trees required to the acre according to the above plans of planting and will serve as a guide to the grower in estimating his plant requirements.

NUMBER OF TREES TO THE ACRE.

<i>Distance apart.</i>	<i>Square.</i>	<i>Triangular.</i>	<i>Hexagonal.</i>
25 x 25 feet	70	64	81
25 x 20 ,,	87	79	—
24 x 24 ,,	76	—	86
22 x 22 ,,	90	—	103
20 x 20 ,,	108	98	126

Having provisionally selected the site for planting, test holes should be dug in order to ascertain depth of soil and the nature of the sub-soil. The sour orange is a deep rooting tree, and a layer of impervious rock or hardpan within 5 or 6 feet of the surface is bound to make trouble in the future. The effect may not be observed for several years, but sooner or later troubles of various kinds will arise and cannot be readily remedied. The same remarks apply to any water standing at a similar distance below the surface. It will therefore be obvious to planters in Dominica that some of the lands originally under seedling limes will be entirely unsuitable for the budded tree. Having lined out and drained the field, the digging of holes for planting is an important operation. The holes should be dug 2½ ft. wide and 2 ft. deep, and well broken up at the bottom, and filled with the top soil and decaying vegetable matter which should be well mixed. They should be filled to a higher level than the surrounding land and allowed to settle for several weeks before planting. Plants received from the nursery should be examined and any damaged roots removed with a sharp knife. When properly settled the prepared hole should be opened up sufficiently to allow for planting operations, care being exercised to see that the trees are firmly planted and the crown roots remain about two or three inches above the general level of the field after settling. It is very important to set the trees precisely at the same height that they were in the nursery. A citrus tree planted too deep is doomed to failure. The practice of planting the sour orange seedlings and budding them *in situ* is sometimes resorted to, but it has no real merit. The age at which a budded lime tree will come into commercial bearing depends so much on the care and attention given to it. An indication, however, can be given by the fact that such trees, grown in the Department's Experiment Station, yielded at the rate of 139 barrels per acre during the fourth year from planting, with *Tephrosia candida* grown as a cover crop for mulch purposes. Whilst waiting for the trees to come into bearing the land may be planted with short crops in order to gain some revenue, but such practice should be carefully carried out in order to assure that the growth of the trees is not interfered with. Ground provisions, tobacco, ginger, beans, pigeon peas, etc., may all be grown to advantage. A strip of *Tephrosia* between the rows, and horse beans surrounding the plants, if the ground is prone to become very weedy, will greatly improve the soil, especially when the *Tephrosia* is cut and applied as mulch to the trees. Inter-cropping with sugar cane is not always to be recommended, as it has been observed that grubs often associated with the sugar cane have been responsible for the death of many

LIME VARIETIES.

young trees. Some planters are experimenting with the growing of lemon grass between the trees for mulch purposes, and planting their trees at a greater distance between the rows. It is doubtful if this practice of growing mulch on the spot will be generally followed, as it reduces so considerably the productive area of the estate, and this most planters can ill afford owing to the economic zone for the growing of the lime having been already so extensively reduced through the presence of Withertip disease. Furthermore lemon grass, although providing excellent mulching material, is a gross feeder, and it would be necessary to manure it in order to maintain the quantity essential for the proper mulching of the field. It is therefore doubtful if the cost of such a method, coupled with the restricted number of bearing trees would prove as economic as growing the grass on adjacent lands which are unsuitable for citrus growing.

On no account should newly planted land be rented out to tenants, for they will get all they can out of the land without reference to the good of the trees.

There exists quite a mistaken idea that Dominica soils are so rich in available plant food that fertilization of the soil is unnecessary. The judicious use of fertilizers is very essential in citrus growing, for apart from what they will do in prompting growth and production, they have a tremendous influence on the quality of the fruit. How much, and what kinds to use are questions extremely difficult to answer specifically, and it is usually advisable for the grower to experiment on his own fields in order to form some idea as to the best course to follow. Every estate should provide itself with a spraying outfit in order to be prepared to combat any pests such as scale as may seriously attack the trees, especially during the young stage. The call for the necessity of spraying may not be often in Dominica, owing to the presence of friendly parasitic fungi keeping the scale insects in check, but it is advisable to be prepared for this or any other insect trouble.

The man in charge, whether he be the owner or manager of the estate, is of more importance to the success of the undertaking than any of the foregoing factors. Young citrus trees of all kinds require careful nursing at all stages; the preparation of the land, planting and subsequent treatment must be carefully attended to in every detail. It is not sufficient merely to put the plant in the ground and cutlass around it periodically until the bearing age is reached, for even if by this method the grower is fortunate enough to escape direct loss, there will be a very real if less obvious loss of time before the trees come into bearing and of reduced crops when they do.

LIME VARIETIES.

Of the many sour citrus varieties introduced by the Department and resistant to Withertip disease, Bears' Seedless, Tahiti and the Woglum lime are the varieties most closely approximating the characteristics of the West Indian lime so far as the fruits are concerned.

Bears' Seedless, however, fruits somewhat tardily, and so does the Tahiti variety. There are evidences that these two varieties appear unsuited to the sour orange stock on which they have been budded, and it is proposed to try them on other stocks.

Woglum lime, however, has proved itself a heavy bearer on the sour orange and is the variety most sought for growing in wet districts. The fruits, however, are larger than West Indian, but the acid content is high and the juice flavour is very similar to the West Indian lime. A sample shipment of this lime to England evoked interest, and the Department has been informed that a good market could be established provided that the fruit could be shipped in commercial quantities. *Citrus aurantifolia*, a variety which at one time was thought to be promising, has proved itself to be so variable that it cannot be recommended for cultivation. Fruits of this variety are not uniform in shape, and have a very low juice content when compared with the West Indian lime. The acid content is also variable; some fruits being almost as sweet as an orange.

During the year samples of essential oil obtained from *Citrus aurantifolia* and Woglum's lime were forwarded to the Imperial Institute for examination. These samples were reported on as follows:—

REPORT ON LIME OILS.

IMPERIAL INSTITUTE,
LONDON, S.W. 7.

0.2057/29.

REPORT ON LIME OILS FROM DOMINICA.

The samples of lime oil which are the subject of this report were forwarded to the Imperial Institute by the Agricultural Superintendent, and are referred to in his letter No. 234 of the 19th September, 1929.

It was desired to ascertain, with a view to possible extensive planting of the trees, whether oils represented by the samples would be saleable, and if so, the prices which they would realise on the United Kingdom market.

DESCRIPTION.

The samples were as follows :—

- (1) *Citrus aurantifolia*. *Ecuelled*. Weight $3\frac{1}{2}$ oz.
- (2) *Woglum's lime*. *Ecuelled*. Weight 2 oz.

Both oils, as received at the Imperial Institute, were turbid owing to the presence of moisture. After filtration they were clear and of brownish-yellow colour, the Woglum's lime oil being slightly the darker of the two.

The odours of the two oils were quite distinct, that of the *C. aurantifolia* oil being pleasant, but considerably milder than that of the Woglum's lime oil. The latter oil possessed a marked odour and taste of citral.

RESULTS OF EXAMINATION.

The oils were found to have the following constants, which are shown in comparison with (a) the corresponding figures for a sample of expressed *Citrus aurantifolia* oil prepared from fresh limes by a firm of essential oil distillers in London and (b) those recorded by Parry ("Chemistry of Essential oils," Vol. I. p. 419) for hand-pressed West Indian Lime oils :—

	<i>Present Samples</i>		<i>Expressed</i>	<i>Hand-pressed</i>
	<i>C. auran-</i> <i>tifolia</i> .	<i>Woglum's</i> <i>lime</i> .	<i>C. auran-</i> <i>tifolia</i> oil.	<i>West Indian</i> <i>lime</i> oil.
15/15/C				
Specific Gravity at	0.8737	0.8590	0.8657	0.878 to 0.90
Optical Rotation α_D	53.40	56.74	58.8	30 to 38
	(Recorded by Gildemeister.)			
Refractive Index n_D	1.483	1.476	1.4777	1.4820, to
	at 19C	at 19 C		1.4860
Solubility in 90 per	Soluble	Soluble	Soluble	Soluble in 4
cent alcohol at 15 C	in 7 vols.	in 6 vols.	in 10 vols.	to 10 vols.
	with	with	with	with slight
	slight	slight	slight	turbidity
	turbidity.	turbidity.	turbidity.	

These results show that the physical constants of the *C. aurantifolia* oil are nearer to those of normal expressed lime oils than are the constants of the Woglum's lime oil. Both oils, however, have a considerably higher optical rotation than the ordinary commercial hand-pressed West Indian lime oils.

COMMERCIAL VALUE.

The oils were submitted to two firms of essential oil merchants in London, who furnished the following observations regarding them :—

- (1) We have now examined the samples of *Citrus aurantifolia* and Woglum's lime oil, the odour and flavour of which are very good. Of the two the Woglum oil is superior. Neither sample is equal, however, to the finest hand-pressed oil of limes. The value might be taken as intermediate between that of distilled oil of limes and hand-pressed oil of limes which at to-day's market price would be 43s. per lb.

MINOR INDUSTRIES.

(2) Both these oils would very probably be of considerable interest to us. However, owing to the small quantities available it would be difficult to state with any degree of accuracy the commercial value. We should think that the Woglum's lime oil would be equal to the price of the finest selected Sicilian lemon oil, that is 10s. to 11s. per lb. to-day, and the *Citrus aurantifolia* oil perhaps a trifle higher. We should be very pleased, however, to have larger samples in order that we might make more extensive trials. The flavours of these oils are quite distinctive, and we should be quite prepared to exploit them if we were in a position to obtain supplies.

REMARKS.

The result of this enquiry has shown that oils of the quality of the present samples would be marketable in the United Kingdom. It will be observed, however, that their actual values seem to be somewhat doubtful as the two firms consulted furnished widely different valuations. It is therefore desirable that larger samples (of about 2 lbs. each) should be prepared and forwarded to the Imperial Institute for further submission to the trade in order to ascertain more definitely the prices which they would be likely to realise if shipped in commercial quantities.

29th November, 1929.

LIME HYBRIDS.

In last year's report reference was made to a considerable number of hybrids raised by cross pollinating *Citrus aurantifolia* and Woglums lime with the West Indian lime. The majority of these hybrids are growing well, and averaging 4 feet in height, mostly stocky in growth, and show marked divergent characters. If foliar characteristics can be taken as a guide many hybrids are distinctly promising, and, although grown in an area which was previously rendered derelict through withertip, have so far shown no sign of being affected by this disease. It is too early to draw conclusions as to the result of this work. Back crossing with the West Indian lime will be carried out with the most promising of the hybrids as soon as opportunity occurs.

MINOR INDUSTRIES.

FRUIT INDUSTRY.

The best indication of the progress of development in the above industry may be gained by quoting the Department's figures of distribution of budded and grafted fruit trees since January, 1927. They are as follows:—Washington Navel Oranges 2,812; Grapefruit 3,563; Villa Franca Lemon 1,051; Other Sweet Citrus 237 and Mangosteen 352. The demand for fruit trees is still brisk and every effort is put forward to meet it.

The Government has established a central fruit packing depôt in Roseau with the view of ultimately handing it over to a co-operative association of fruit growers. Fruit growers are at present required by law to forward their fruit to this depôt for selecting, grading and packing under the supervision of officers of the Agricultural Department. The crates, which are of up to date pattern and of a style approved by the Fruit Trade, are stamped with a government mark to show that the fruit has been inspected. Peasants' fruit is dealt with in a similar way, and cash advances made by the Peasants' Adviser in necessitous cases. The marketing is also of a co-operative nature, as the fruit is shipped to a Government Agent for disposal. This scheme has worked well in Bermuda and in addition to better prices being realised, advices received from the Agent inform as to the condition of the market and prices likely to be realised.

The Central Packing Depôt is the property of the Government and is shortly to be equipped with a cold storage plant and machinery for the cleaning, grading, etc. of grapefruit and oranges.

At the moment each island in the West Indies is struggling on its own to gain recognition in this market with small shipments of fruit and of grades which are in many cases foreign to the trade.

IMPERIAL FRUIT SHOW.

If all the fruit producing islands worked in close co-operation and had similar laws affecting the exportation of fruit, and adopted uniform marketing methods, paying particular attention to grade and pack, West Indian fruit would soon gain recognition and a substantial trade would develop.

Appreciation of this view has resulted in a Conference in Trinidad and in Antigua, the first convened by the authorities of the Tropical College attended by the Directors and Superintendents of Agriculture of the West Indies, and the second for the Agricultural Superintendents of the Leeward Islands. The findings of both conferences coincide in their unanimity for co-operative methods. The results of the Trinidad conference are being published by the Tropical College of Agriculture.

IMPERIAL FRUIT SHOW.

The Department staged a representative collection of citrus fruits grown in Dominica at the Imperial Fruit Show at Birmingham during 1929 primarily with the object of advertising the potentialities of the Island with regard to its suitability for the cultivation of this class of fruit.

Difficulty was experienced in obtaining a sufficient quantity of some varieties owing to the lateness of the crop. As it was, much of the fruit, especially oranges, was scarcely in season and with the small quantities available it was extremely difficult, and in some instances impossible to put up crates of uniform grade. Moreover the fruit had to be shipped nearly six weeks before it was on show. Arrangements in England, as on previous occasions, were in the hands of the West India Committee, and under the personal direction of the Secretary, Sir Algernon Aspinall, C.M.G., C.B.E. Mr. G.P. Osmond, Chief Clerk of the West India Committee, was in charge of the exhibits, which were tastefully set out and received the encomium not only of the public but also of the organisers of the Fruit Show and the Judges.

Considering these difficulties the results were most encouraging, as the photograph reproduced in these pages and the following reports show.



Although the fruit was not graded for commercial purposes, and was only forwarded as a representative collection of citrus fruits from Dominica, the whole consignment was submitted to the Midland Agents of George Munro, Limited, Messrs. Francis Nicholls, Limited, of Birmingham for their observations, who reported as follows:—

IMPERIAL FRUIT SHOW.

FRANCIS NICHOLLS, LTD.,
SMITHFIELD MARKET,
BIRMINGHAM.

4th November, 1929.

The Secretary,
West India Committee,
14, Trinity Square,
London, E.C. 3.

Dear Sir,

We have pleasure in submitting our report enclosed, on the citrus fruit from Dominica, which was exhibited at the Imperial Fruit Show, Birmingham.

In our opinion the fruit generally was good, and several varieties particularly, Triumph Grapefruit, also "Sicilian Lemons," "Woglum Lemons" and Limes would meet a very good reception on our market and command good prices.

Packing would be improved if lighter cases similar to the Californian were used, and the fruit packed more tightly, grading generally was poor.

Yours faithfully,

FRANCIS NICHOLLS, LTD.,
(sgd.) FRANCIS W. NICHOLLS,
Managing Director.

REPORT BY FRANCIS NICHOLLS, LTD., BIRMINGHAM.

<i>Variety.</i>	<i>General appearance.</i>	<i>Skin.</i>	<i>Content.</i>	<i>Flavour.</i>	<i>Condition.</i>
GRAPEFRUIT.					
Walters.	Good.	Thick smooth slightly marked.	Good.	Bitter sweet.	Sound.
Triumph.	Very good.	Thin smooth and clean.	Very good.	Very good, sweet.	„
Duncan.	Good.	Fairly thick, „ clean, rough.	Good.	Bitter sweet.	„
Silver Cluster.	Good.	Thick, fairly clean.	Good.	„ „	„
Marsh's Seedless.	Good, rather dull.	Very thick.	Fair.	Bitter sweet, rather insipid.	„
Jamaica.	Very good.	Very smooth, moderately thick.	Very good.	Sweet, slightly bitter.	Wasty.
LEMONS.					
Villa Franca.	Fairly good.	Clean, moderately smooth & thin.	Very good.	Very good	Very wasty.
Sicilian.	Good.	Thin, clean, bright.	Good.	Very good.	Slight waste.
Woglum.	Good, large.	Very good.	Very good.	More of lime than lemon.	Very wasty.
LIMES.					
Woglum.	Good. large.	Clean, good colour.	Good.	Good fruit of fine texture.	Sound.
Citrus aurantifolia.	Poor in all respects.				
West Indian.	Fair, small.	Clean & very thin, green.	Good.	Good.	Wasty.

MINOR INDUSTRIES, *continued.*

Mr. F. L. Squibbs, the Assistant Agricultural Officer, who was on leave in England at the time, paid two visits to the Show. He succeeded in interesting several prominent members of the trade in our fruit, particularly the Grapefruit and Lemons. These were considered superior to samples of similar fruits from South Africa. It seemed that with standard grading and packing, and early marketing there would be no difficulty in obtaining good prices for them.

A noteworthy point about the limes was that although they had not carried too well through being so long in transit, the bad fruits had not affected those with which they had come in contact. If proper shipping facilities were available, large limes would find a ready market at remunerative prices in England. On account of their larger size Woglum Limes and Lemons should also prove acceptable to the trade. The Villa Franca and Sicilian lemons exhibited were adjudged as being of very fine quality, and we were advised that a trade could be built up with this fruit, especially if it could be marketed in England during the months of July, August and September prior to the arrival of the Mediterranean crop.

MINOR INDUSTRIES *continued.*

Coconuts. The serious effects of the preceding year's hurricane is shown by the large decrease in export figures of copra and coconuts for the year 1929.

The amount of copra is two-thirds less than the quantity exported in 1928 with an almost corresponding decrease in the number of dried nuts.

The young cultivations are approaching the bearing age, are thriving, and there is a marked absence of disease.

The demand for young plants has fallen off slightly, which is to be expected in view of the large numbers sent out during the past three years.

Cocoa. The prediction made in last year's report that the 1928 hurricane would reduce the following year's crop by 50% unfortunately proved an almost accurate one, the quantity of raw cocoa exported in 1928 being 572,348 lbs. against a figure of 275,145 lbs. for 1929. New plantings are being steadily made, plants being always available for distribution from the Department's nurseries.

Coffee. A large number of coffee plants were distributed from the Department's nurseries during the year. Again the hurricane and low price effects are illustrated by the decline in exports for 1929.

Vanilla. The progress made with the cultivation and curing of this crop has been both marked and encouraging. From an export of 2,964 lbs. for 1928 the figure for 1929 has risen to 3,650 lbs.

Local buyers and planters are steadily improving the quality of the cured product, thus overcoming one of the principal difficulties in developing this industry.

CHIEF EXPORTS.

CHIEF EXPORTS.

TABLE OF AGRICULTURAL EXPORTS FOR THE TRIENNIAL PERIOD
1927 TO 1929.

	1927.	1928.	1929.
<i>Lime Products:</i>			
Concentrated Juice ...	106,971 galls.	90,731 galls.	35,446 galls.
Raw Juice	173,848 „	306,090 „	475,102 „
Lime Juice Cordial ...	845 „	337 „	20 „
Distilled Oil	31,346 lbs.	32,174 lbs.	30,894 lbs.
Ecuelled Oil	7,828 „	7,677 „	5,256 „
Green Limes	21,578 brls.	27,065 brls.	16,476 brls.
Pickled Limes	263 „	225 „	67 casks.
<i>Cocoa Products:</i>			
Cocoa Raw... ..	684,550 lbs.	572,348 lbs.	275,145 lbs.
Cocoa prepared	139 „	417 „	434 „
<i>Coffee Products:</i>			
Coffee	1,104 lbs.	1,669 lbs.	152 lbs.
<i>Coconut Products:</i>			
Coconuts	236,553	253,817	63,662
Copra	140,393 lbs.	189,366 lbs.	57,223 lbs.
<i>Sugar Products:</i>			
Rum	544 galls.	403 galls.	252 galls.
Syrup	—	110 „	—
<i>Spices:</i>			
Vanilla	1,226 lbs.	2,964 lbs.	3,650 lbs.
Nutmeg	459 „	£10	£8
Ginger	9,864 „	£312	£213
<i>Honey Products:</i>			
Honey	4,924 lbs.	120 lbs.	1,080 lbs.
Bees Wax	238 „	—	93 „
<i>Various Products:</i>			
Bananas	8,828 bunches	3,393 bunches	448 bunches
Oranges	908 brls.	460 brls.	837 brls.
Mangoes	4,734 crates	5,985 crates	5,309 crates
Grapefruit... ..	727 „	729 „	1,249 „
Pears	£406	£1,053	1,568 „
Miscellaneous fruits ...	—	—	£375
Bay Oil	9,692 lbs.	13,407 lbs.	18,349 lbs.
Orange Oil... ..	2,638 „	742 „	1,116 „
Kola Nuts	£20	1,800 „	—
Tamarinds... ..	11 brls.	23 brls.	36 brls.
Vegetables	£157	£52	£20
Farine	£33	£90	£18
Hides & Skins	£75	£87	£52
Leather unmanufactured..	1,619 lbs.	2,633 lbs.	2,231 lbs.
Plants, seeds & bulbs ...	£10	£4	£2
Fruits, jams & jellies ...	£595	£17	£10
Turtle Shells	318 lbs.	150 lbs.	242 lbs.
Baskets	£4	£6	£1
<i>Forest Products:</i>			
Hardwood	79,575 feet	68,299 feet	47,150 feet
Firewood	993 cords	601 cords	538 cords
Canoe Shells	53	64	64
Shingles	£3	£5	£3
Charcoal	9,520 lbs.	7,087 lbs.	5,021 lbs.
Locally made boats ...	£30	—	£53
Total Values	£155,806	£190,622	£172,303

PLANT LEGISLATION.

SUMMARY OF LEGISLATION AFFECTING CROPS.

The first step in the direction of plant protection was taken in 1898 when Act No. 3 was passed to provide against the importation of articles likely to introduce diseases among plants. Under the authority of this act, a Proclamation dated August 27, 1898, prohibited the importation from Ceylon of plants, seeds, berries, earth and soil. This Act was suspended by Law No. 9 of 1904, in which provision is made for the fumigation and disinfection of imported plants, cuttings, buds, grafts, bulbs, roots and seeds, and their packages; also fruit and vegetables intended for propagation, and not for consumption as food.

Under Law No. 6 of 1907 power is conferred to prohibit by proclamation the importation of plants, cuttings, bulbs, roots, seeds or berries, or any earth or soil, or any articles packed therein, or any packages, or other articles or things likely to be the means of introducing any plant disease.

A Proclamation dated February 5, 1909, under No. 6 of 1907, prohibits the importation into Dominica of all plants from Dutch Guiana, which are likely to be the means of introducing disease from that country.

A Proclamation dated October 26, 1910, prohibits the importation of banana plants and suckers from all countries of Central or South America, and from the island of Trinidad; also of coconuts in husk, and all growing plants of coconuts, from Cuba, Jamaica, Trinidad and all countries of Central and South America.

A Proclamation dated October 9, 1916, restricts under certain conditions, the entry of rooted plants of all kinds from the United States of America, Cuba, Jamaica, Haiti, San Domingo, and Porto Rico.

A Proclamation dated October 26, 1917, prohibits the importation of seed cotton or cotton seed from all countries or places outside the Colony of the Leeward Islands, save and except from some other Presidency of the Colony, or from the Colony of Trinidad and Tobago and its dependencies, or from the Colonies of Grenada, St. Vincent, and St. Lucia, provided, however, that small quantities of cotton seed for experimental purposes may be imported into the Presidency of Dominica, on the written permission of the Superintendent of Agriculture on such terms and conditions as he may prescribe.

A Proclamation dated December 21, 1920, prohibits the importation of sugar-cane from any other country into this Presidency, for the time being.

A Proclamation dated January 28, 1923, prohibits the importation of Johnson Grass (*Holcus halepensis*) from any other country into this Presidency.

A Proclamation dated January 28, 1923, prohibits the importation of banana plants, (suckers) from all countries except other Leeward Islands, Grenada, St. Vincent, and Barbados.

A Proclamation dated December 24, 1923, prohibits the importation of coconuts and coconut plants from any other country into this Presidency until further orders.

A Proclamation dated May 4, 1925, prohibits the importation of Banana plants (suckers) into this Presidency from all countries except other Leeward Islands, St. Vincent, and Barbados, without the written permission of the Governor.

A Proclamation dated July 27, 1925, prohibits the importation of citrus plants from all countries except Windward and Leeward Islands, Trinidad and Tobago, and Barbados. It

PLANT LEGISLATION.

is, however, allowed that the Curator or Agricultural Officer shall have the power to import for scientific purposes anything thus prohibited, on his making a report of such importation for the information of the Governor.

An Ordinance, No. 23 of 1925, regulates the examination, curing and exportation of Vanilla and also prohibits certain dealings with the same.

An Ordinance dated September 18, 1925, regulates the examination, curing and exportation of Tobacco.

With regard to the exports of plants, it is only necessary to state that such cannot be admitted into the United States of America unless accompanied by a certificate showing that they have been inspected by a duly authorized official, and are found free from injurious plant diseases or insect pests.

Ordinance No. 3 of 1926 regulates the Examination and Exportation of fruit, likewise prohibiting the shipment of defective fruit.

Ordinance No. 2 of 1927 for the prevention and eradication of Diseases and Pests affecting vegetation provides for (1) the appointment of Inspectors (2) registration and inspection of nurseries.

Ordinance No. 4 of 1929 provides for the exportation of fruit with special reference to Canada and Bermuda, and the green lime trade with New York.

S.R. & O. No. 10 of 1929 (under Sec. 17 of the above) prohibits the exportation of fruit except such as is inspected, graded and packed at the Government Packing House or at licensed packing houses in the case of green limes.

S.R. & O. No. 13 of 1929 (under Sec. 5 of Ordinance No. 2 of 1927) prohibits the importation of planting material likely to introduce the Mediterranean Fruit Fly from certain countries in Europe and North and South America.

A Proclamation dated March 24th 1930 prohibits the importation of fresh fruits from North and South America, Bermuda, France, Spain, Italy, etc. and revokes the above.

METEOROLOGICAL REGISTER.

RAINFALL RETURNS, DOMINICA, 1929.

STATIONS.	JAN.	FEB.	MARCH.	APRIL.	MAY.	JUNE.	JULY.	AUGUST.	SEPT.	OCTOBER.	NOV.	DEC.	TOTALS.
1. Bagatelle, Soufrière	4.56	3.22	3.64	1.48	5.82	7.27	8.60	9.66	4.38	13.16	12.68	6.48	80.95
2. Batalie	2.29	1.70	4.35	.96	.75	5.52	6.63	8.00	8.77	5.91	6.88	4.09	54.85
3. Bellevue													
4. Blenheim													
5. Botanic Gardens	5.18	3.13	7.36	1.27	2.80	10.87	13.13	12.55	5.63	12.19	14.39	8.48	96.98
6. Canefield	5.07	3.06	6.18	2.05	1.69	8.56	12.54	11.82	5.78	13.05	11.98	7.37	89.15
7. Castle Bruce													
8. Clark Hall	6.05	4.66	8.62	1.51	4.42	13.89	16.65	16.02	6.75	10.92	14.87	11.94	116.30
9. Everton													
10. Fontaine													
11. Goodwill													
12. Governor	6.04	3.17	6.81	2.83	9.66	11.15	12.82	18.74	10.49	22.92	22.16	8.34	135.13
13. Hampstead	1.80	5.14	4.66	5.62	6.44	8.90	7.28	11.96	8.50	11.68	15.39	4.25	91.62
14. Hillsborough													
15. Londonderry	1.25	4.70	7.50	6.20	6.50	10.20	1.60	7.20	5.70	18.09	20.42	4.24	93.60
16. Moore Park	3.91	3.14	5.03	1.62	3.69	10.07	11.16	13.08	6.40	10.75	11.54	4.81	85.20
17. Morne Bruce	5.72	3.89	8.42	1.66	3.50	12.23	14.50	14.37	6.57	12.88	15.82	9.13	108.69
18. Picard	2.36	3.94	8.28	3.63	4.63	8.96	14.91	14.19	12.03	7.55	12.47	9.18	102.13
19. Pte. Mulâtre	3.72	2.32	4.85	3.07	6.84	11.47	14.59	21.65	7.71	25.18	20.51	6.15	128.06
20. Rosalie													
21. Shawford	19.09	6.81	16.44	7.93	25.06	28.79	38.43	25.78	22.83	19.39	37.30	33.38	281.23
22. Soufrière	5.74	3.94	6.00	1.68	7.89	6.56	11.60	10.71	6.14	16.33	14.93	7.40	98.92
23. Sherwood	13.62	8.87	13.43	4.70	12.39	24.01	25.59	22.31	11.31	21.62	29.88	23.51	211.24
24. Stowe	5.03	3.38	5.14	3.48	8.26	10.01	12.89	19.25	7.99	14.63	22.59	8.17	120.85

* Records destroyed by hurricane also gauge.

Mean Rainfall 16 Stations ... 118.43 inches.

7 Leeward Stations... 95.29 "

4 Windward " 116.25 "

2 Inland " 246.24 "

3 Lasoye " 90.14 "

METEOROLOGICAL REGISTER.

METEOROLOGICAL REGISTER KEPT AT BOTANIC GARDENS, DOMINICA.

Year. 1929. Months.	THERMOMETER.				Relative Humidity.		Thermometer. Max'm. Min'm.		Barometer Corrected. <i>Reduced to 32° Fh. Sea Level.</i>		Rainfall.	Barometer Corrected.		Thermometer.		REMARKS.
	Dry.		Wet.											Highest	Lowest.	
	9 a.m.	3 p.m.	9 a.m.	3 p.m.	9 a.m.	3 p.m.	Highest	Lowest.								
January ...	75.5	78.4	70.5	71.7	74.9	68.4	84.2	75.1	30.02	29.95	5.18	30.08	29.85	87	65	
February ...	74.6	78.7	69.1	70.4	73.2	63.1	85.5	66.5	30.02	29.95	3.13	30.09	29.85	87	62	
March ...	76.4	78.6	69.5	70.9	67.9	64.9	85.4	66.7	30.01	29.93	7.36	30.08	29.88	89	65	
April ...	79.9	81.9	70.8	71.8	60.4	56.6	88.1	68.7	30.01	29.93	1.27	30.08	29.87	91	66	
May ...	80.9	82.5	71.9	72.9	61.7	58.7	88.4	70.7	30.00	29.95	2.80	30.08	29.88	91	64	
June ...	81.6	83.2	73.7	74.4	65.7	64.0	89.5	72.2	30.02	29.96	10.87	30.09	29.89	95	70	
July ...	80.0	83.1	74.0	74.4	72.3	62.4	87.7	72.2	30.01	29.96	13.13	30.08	29.90	90	70	
August ...	80.2	82.2	74.9	74.8	75.4	66.8	87.7	71.9	29.97	29.91	12.55	30.02	29.80	90	70	
September ...	80.8	83.7	76.1	77.4	77.6	66.6	87.9	72.9	29.94	29.89	5.63	29.98	29.85	91	71	
October ...	80.8	82.0	77.2	80.4	82.6	93.0	88.8	72.5	29.91	29.85	12.19	29.97	29.71	91	70	
November ...	78.6	79.4	74.1	74.8	78.0	78.3	84.6	72.1	29.91	29.86	14.39	29.99	29.80	89	69	
December ...	75.8	78.4	71.4	71.2	77.8	67.3	82.2	68.8	29.99	29.91	8.48	30.04	29.82	86	65	
ANNUAL 1929	78.8	81.0	72.8	73.8	72.3	67.5	86.7	70.8	29.98	29.92	96.98	30.05	29.84	89	67	

Highest Maximum Temperature = 95° on June 20th. Lowest Minimum Temperature = 63° on January 18th.
 „ Barometer (Corrected) = 30.02 „ January 4th. „ Barometer (Corrected) = 29.71 „ October 30th.
 Greatest Rainfall in 24 hours = 5.70 „ October 5th. Mean Annual Temperature = 79.9°.

METEOROLOGICAL REGISTER.

RAINFALL AT THE BOTANIC STATION, DOMINICA, 1909-1929.

Month.	1909.	1910.	1911.	1912.	1913.	1914.	1915.	1916.	1917.	1918.	1919.	1920.	1921.	1922.	1923.	1924.	1925.	1926.	1927.	1928.	1929.	Monthly Mean Rainfall.
January ...	2'30	5'20	11'46	8'21	7'48	3'22	1'76	10'79	5'00	6'02	2'42	7'54	6'82	6'50	3'82	6'25	7'88	3'68	5'50	6'60	5'18	5'89
February ..	5'02	11'42	4 00	1'32	2'32	5'56	1'04	1'90	4'10	8'73	1'52	4'76	1'02	4'30	2'30	1'90	1'95	2'46	4'50	4'25	3'13	3'69
March ...	2'08	1'16	3'11	4'60	7'29	2'23	0'84	4'52	6'74	3'32	0'69	3'80	4'46	2'80	3'46	0'66	3'50	'96	5'37	6'30	7'36	3'58
April ...	8'12	2'80	5'00	3'38	1'57	6'45	15'75	1'22	0'47	1'86	2'36	'22	3'06	2'26	3'77	1'46	'40	2'77	4'67	4'16	1'27	3'48
May ...	1'92	7'30	11'16	1'56	3'46	2'58	3'65	2'05	2'94	5'90	4'60	2'38	1'54	2'64	0'13	3'18	2'76	2'44	6'69	2'25	2'80	3'52
June ...	9'00	14'26	6'54	5'44	3'49	7'27	9'17	4'82	15'34	6'04	3'88	3'48	1'96	7'14	4'18	4'42	5'80	5'76	15'03	6'68	10'87	7'17
July ...	9'86	12'60	8 08	5'83	7'57	11'83	14'84	8'23	13'70	11'28	12'64	12'08	11'18	6'08	8'20	13'64	6'23	10'14	9'61	6'58	13'13	10'16
August ...	13'12	10'22	11'43	4'88	10'93	3 98	14'74	16'58	8'53	8'46	9'64	8'76	9'30	9 26	11'44	11'28	13'88	10'10	4'65	12'80	12'55	10'31
September.	6'44	8'90	15'34	3'32	8'39	7'71	11'36	6'20	15 02	4'14	7'06	8'60	6'28	10'68	4'28	4'88	9'12	4'12	6'20	8'10	5'63	7'70
October ...	13'10	3'82	7 06	7'26	10'40	5'13	8'41	10'06	2'46	6'67	7'50	12'60	9'41	2'68	9'84	10'98	12'55	5'86	8'84	4'35	12'19	8'15
November.	4'36	5'40	6'91	11'20	4'28	9'44	10'05	14'28	1'92	3'36	9'02	4'62	2'44	3'00	1'06	6'86	9'60	7'54	8'70	7'93	14'39	6'97
December .	5'82	7'50	7'14	6'66	2'72	9'70	8'40	3'77	4'58	5'86	6'70	5'62	4'22	6'90	1'92	13'65	2'02	3'75	1'37	5'38	8'48	5'82
Total ...	81'44	90'64	97'26	63'72	69'90	75'10	100'01	83'42	80'80	71'46	68'03	74'46	61'72	64'24	54'40	79'16	75'69	59'58	81'13	75'38	96'98	76'41

Average year 76'41 inches.

PEASANTS' INFORMATION BUREAU.

APPENDIX A.

PEASANTS' INFORMATION BUREAU.

A statement is attached showing the quantity and value of produce dealt with from 1st April 1929 to 31st March 1930, including fruit accounted for by the Government Trade Agency.

The total receipts during the period amounted to £2,442. 14. 11. and the total payments to £2,339. 17. 7½. with a balance carried forward of £198. 7. 10.

A number of factors make the produce returns somewhat misleading as a measure of the work accomplished by the Bureau. The chief of these were the aftermath of the hurricane of 1928, the effects of "red root" disease on the output of limes, the high prices of lime products and the depression in the world's markets for concentrated juice, cocoa, coffee, copra and certain minor products.

Cocoa. Only some 10 bags were disposed of, as compared with 25 bags last year, mainly as a result of the hurricane of 1928.

Vanilla. The quantity disposed of for peasants has been relatively small, though with gradual increases year by year. Vanilla is sold to local dealers at prices averaging 4/- per lb. The Peasants' Adviser acts as Vanilla Inspector under the provisions of Ordinance No. 23 of 1925.

Concentrated Lime Juice is one of the peasants' products, and this the Bureau assists in marketing. Empty casks are supplied to producers who return the concentrated juice therein for shipment, and in certain cases a reasonable cash advance is made. On receipt of account sales all expenses are deducted and the balance handed over to producers. This system is chiefly of benefit to small proprietors on the Windward coast, who cannot readily dispose of their limes as such.

Green & Ripe Limes, having realised high prices for the period under review, the Bureau has not been called upon to deal with any appreciable quantity. The prices have fluctuated between 15/- and 50/- for green limes and 12/- and 16/- for ripe limes.

Other Fruit shipped increased considerably, even before the coming into operation of the Exportation Ordinance of 1929 (October 1st.) The first fruits shipped in the earlier part of the financial year were mangoes and avocado pears, and the prices obtained in Bermuda were such as to leave a remunerative margin despite the heavy incidental expenses, such as freight and cold storage charges.

Oils, Farine & Miscellaneous. These products have been disposed of by the peasants direct to local dealers, who are in a position to pay cash on receipt, and amongst whom competition has been sufficiently keen to assure peasants a reasonable remuneration. Enquiries are constantly being made for information, and the interviewing of peasants takes up a large amount of the Peasants' Adviser's time.

Since the inception of the Bureau in 1926 weekly market reports have been circulated throughout the island and published in the local press. In this and other ways, such as the purchase and distribution of seeds and manures at cost and charges, the Bureau has been of considerable help not only to planters but to peasants, for whose benefit it was instituted.

PEASANTS' INFORMATION BUREAU.

STATEMENT OF PRODUCE DEALT WITH BY THE PEASANTS' INFORMATION
BUREAU FOR THE YEAR APRIL 1ST 1929 TO 31ST MARCH, 1930.

<i>Produce.</i>	<i>Quantity.</i>	<i>Cost or Estimated Value.</i>
Cocoa	9 bags 119 lbs.	£ 25. 2. 1
Ginger—black .. .	32 lbs.	8. 0
Vanilla—cured .. .	152½ ,,	38. 1. 3
Lime Juice—concentrated ..	59 casks & 1 barrel	473. 10. 2
Limes—green	5 barrels	7. 5. 10
Limes—ripe	1½ ,,	1. 2. 6
FRUIT.		
Mangoes	47½ crates	25. 13. 6
Oranges	6½ ,,	4. 13. 5
Avocado Pears	153 ,,	128. 17. 5
Lemons	29 ,,	35. 3. 6
		£739. 17. 8

The Fruit Exportation Ordinance came into force on the 1st October, 1929, since which all fruit shipments have been made through the Government Trade Agency.

Fruit accounted for through the Peasants' Information Bureau during this period has amounted to:—

Grapefruit	853 crates	288. 13. 3
Oranges	251 ,,	108. 5. 8
Pears	276 half-crates	85. 7. 0
Lemons	70 crates	41. 3. 10
Limes	5 ,,	2. 7. 4
Tangerines	32 ,,	12. 4. 6
		£538. 1. 7

APPENDIX B.

REPORT ON EXPERIMENTS ON THE MANUFACTURE OF CITRUS PECTIN
FROM LIME SKINS CARRIED OUT AT THE BATH ESTATE,
DOMINICA. AUGUST, 1929.

The process followed in these experiments is that described by Wilson in *The Journal of Industrial and Engineering Chemistry* October, 1925, pp. 1065-1067 in an article "The Manufacture of Pectin" and consists essentially in the extraction of the finely divided citrus skins with a dilute acid at temperatures below 100°C followed by separation of the pectin extract from the residual pulp and precipitation of the pectin from the extract with colloidal aluminium hydroxide formed in the extract by the interaction of ammonium hydroxide and aluminium sulphate.

Laboratory experiments conducted by the writer indicated that this process could be used for the production of a dry citrus pectin with high jelly forming powers. Samples were sent to the Imperial Institute and the report received was sufficiently encouraging to warrant the undertaking of large scale experiments with the primary object of preparing sufficient material for a commercial valuation.

The acid recommended by Wilson for the preparation of the pectin extract is 1% sulphurous acid and this acid was found well suited for the purpose. To avoid the expense of importing liquid sulphur dioxide for the manufacture of sulphurous acid experiments were however made with hydrochloric acid which being a more highly ionised acid than sulphurous could be used at greater dilution to produce a solution of the same hydrogen ion concentration. As these experiments were successful hydrochloric acid was used instead of sulphurous acid in the large scale experiments now described. It is possible that it would be cheaper to use sulphurous acid manufactured on the spot by burning sulphur and absorbing the resulting sulphur dioxide in water. This process would require special plant and would not be economical unless the manufacture of pectin was being carried out continuously on the commercial scale.

The disused and partly dismantled citric acid factory at the Bath Estate was kindly placed at my disposal by the Honourable L. Rose. The plant available was of course not designed for pectin manufacture and necessitated considerable labour in the handling of the product at all stages of manufacture.

The process followed may be summarised as follows:—Fresh wet lime skins from the mills were washed on a large sieve in the river and the washed skins minced in an Enterprise meat chopper. The minced skins were transferred to flour bags and washed in these bags in the river until all very finely divided matter was removed and on squeezing the bags the water issuing no longer showed any turbidity.

The washed comminuted skins were then transferred to enamelled iron vats each of 60 gallons capacity covered with cold dilute hydrochloric acid and allowed to stand over night.

Next morning the contents of the vats were slowly heated to 70–80°C and kept at this temperature for one hour, the mixture being gently stirred from time to time to ensure uniform heating.

The hot mixture was very viscous and was diluted and filtered through boxes perforated at the bottom and lined with flour bags into vats similar to those used in the preparation of the extract. No pressure was used in filtration, when the pulp had drained as fully as it would under gravity it was washed on the filter with several turns of hot water, the washings being combined with the original filtrate. By this process of filtration it was found possible to secure a clear pectin extract provided the minced skins were thoroughly washed as already described.

The filtered extract was allowed to cool and the pectin precipitated by the addition to the well stirred extract first of ammonia water and then of 25% aluminium sulphate solution—the proportions used being determined first on an aliquot portion of the extract and were such as to bring the mixture to pH 4.0 to 4.2.*

The precipitated pectin separates as a jelly, which breaks up into lumps, shrinks and becomes readily filterable. It was found most convenient to filter through the same boxes as were used for filtering the extract and then to transfer the pectin to bags and express retained mother liquor in a hydraulic press. After pressing, the cake of pectin was broken into small pieces and washed in several changes of water or better transferred again to a filtering box and washed in running water while on the filter. The washed pectin was

APPENDIX.

again pressed and the press cake from the hydraulic press broken into small lumps and sun and air dried in shallow aluminium trays.

Three batches of pectin were made by the above process. The following summary indicates the quantities of lime skins used, the quantities of water acid and other reagents, the yields of pectin (crude air dried), ash content of the air dried pectin etc.

	Batch 1.	Batch 2.	Batch 3.
Weight of wet lime skins.	140 lbs.	50 lbs.	50 lbs.
No. of digestion vats used.	2	1	1
Weight of lime skins per vat.	70 lbs.	50 lbs.	50 lbs.
Vol. of water per vat.	32 gallons.	20 gallons.	20 gallons.
Vol. of conc. Hydrochloric acid used per vat.	500 c.c.	350 c.c.	350 c.c.
Vol. of water for dilution per vat.	10 gallons.	6 gallons.	6 gallons.
Ammonia soln. 1.3 per vat.	8 litres.	2.65 litres.	1.1 litres.
Aluminium sulphate soln. per vat.	11½ litres.	7 litres.	4 litres.
Weight of crude pectin (air dried)	7.5 lb.	2.33 lb.	1.61 lb.
% yield on skins.	15.35%	4.7%	3.22%
Ash content.	15.5%	17.15%	7.5%

- * Method of determining pH of a solution. A drop of bromphenol blue (or other suitable indicator) is placed on a white porcelain test plate and a drop of the solution under investigation is added and the two mixed with a glass rod. The resulting colour is compared with a series of standards the pH of the solution being the same as that of the standard it most closely resembles.

This method is only approximate but is accurate enough for the determination of pH in pectin work.

It will be observed that in Batch 3 in which the proportions of aluminium sulphate and ammonia water used are considerably reduced, the ash content of the pectin is much lower than when larger quantities of the reagents are used, but that the yield also is greatly reduced.

The following table shows the total cost of carrying out the experiments and also the actual cost of the pectin produced, based on A reagents used disregarding fuel and labour charges and B the cost including fuel and labour charges, but disregarding non recurrent expenditure such as cost of machine for mincing, cleaning of factory preparatory to starting experiments etc.

<i>Total Cost of Experiments.</i>	<i>Cost per lb. of pectin based on reagents used.</i>	<i>Cost per lb. of pectin including fuel and labour costs.</i>
Meat chopper 1. 7. 6		
Filter pulp 15. 0		
Freight 11. 6		
Aluminium sulphate 35 lb .. 1. 2. 7	18.7 lb.	14. 0
Hydrochloric acid		
2 winchesters 7. 11	1700 c.c.	3. 5
Ammonia. 2 winchesters 10. 10	3 litres.	7. 8
Freight 7. 6		
Cases 13. 11		
Porterage 1. 6		
Flour bags 13. 6		
Sewing 5. 0		
Boxes 2. 8		
Labour. 32 men days 2. 8. 0		29 men days. 2. 3. 6
Coal 1. 0. 0		1. 0. 0
Tubs 10. 0		
£10. 17. 5	£1. 5. 1	£4. 8. 7
Cost per lb. pectin.	2. 2	7. 9

The above values for the cost per lb. are included in this report as they may be of interest but they convey little information as to what pectin production would cost on the commercial scale. In the first place no provision is made for interest on capital expendi-

APPENDIX.

ture or for deterioration and secondly and this is a still bigger correction the costs shown for reagents and for labour are excessive.

Let us first consider the costs shown for reagents. As these were required only in small quantities they had to be purchased from a retail firm at high prices. The following table shows the prices actually paid, commercial quotations and the prices which would have been paid had the quantities bought been purchased at wholesale prices.

A. <i>Actual costs.</i>			B. <i>Commercial quotations.</i>		C. <i>Costs based on B.</i>	
35 lb. Aluminium sulphate,	1.	2. 7	One ton Iron free London Aug. 1929.	£ 8	2.	6
10 lb. Hydrochloric acid.	7.	11	100 lb. New York, Aug. 1929.	\$1.10		5½
10 lb. Ammonia.	10.	10	1 lb. 3d. London Aug. 1929.		2.	6
	£2.	1. 4			5.	5½

Add about 50% for duty and freight etc. making the cost 8/3. The cost of pectin per lb. based on cost of reagents alone would then become 2 2 x 99 or approximately 5d. per lb.

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Labour costs in the experiments recorded here were probably just as disproportionately high as was the cost of reagents. This fact will be understood when it is realised that the grinding of lime skins with a hand driven mincing machine was a slow and arduous process, that no water was laid on in the factory where the work was carried out, necessitating the carrying of water in wooden pails from the river or from a tap in the factory yard into the building and upstairs to the second floor, and finally that the vats into which the pectin extract was filtered for precipitation were situated at some distance from the digestion vessels and that the hot pulp had to be carried by hand in small tubs from one set of vats to the other.

As regards the labour occupied in grinding it is interesting to note that the grinding by hand of 140 lb. lime skins took four men one complete working day—the men working in short shifts two at a time. The same mincing machine was subsequently erected for other work in a place where it was belt driven by power and ground over 60 lb. of lime peel in about 30 minutes requiring the attention of one man only for feeding.

Fuel is another item which appears unduly high in this report. This is due to two causes—the distance of the boiler used from the digestion vats and the fact that the latter were not steam jacketed and could only be heated by placing in a large water tank heated by a steam coil—it thus being necessary to heat a very large volume of water in order to heat a comparatively small digestion vessel.

As already stated the main object of the experiments here recorded was to produce sufficient pectin to allow of a commercial valuation. This object has been achieved, but until such a valuation is received it is not possible to state whether or not the production of pectin is commercially possible under Dominica conditions. The cost price based purely on the consumption of hydrochloric acid, ammonia and aluminium sulphate is very reasonable, but it is not possible to estimate labour and fuel costs when a suitable plant is used.

The ideal plant would consist of a power driven mincer and a steam jacketed digestion vessel which could be discharged directly on to filters placed over the mechanically stirred precipitation vessel, which itself could be discharged directly on to filters to separate the pectin from mother liquors. Such a plant would require little labour but would necessitate some capital outlay, especially as large volumes of liquid are required for the production of comparatively small quantities of pectin.

A less elaborate plant would consist of steam heated digestion vessels placed immediately alongside precipitation vats (to reduce as far as possible labour during the transferring of the cooked pulp from the digestion vessels to the filters) and filters for the pectin placed alongside the precipitation vats. Such a plant while not as convenient as that outlined above would reduce labour costs enormously provided water was laid on to all vessels and filters and provided the hydraulic press and washing appliances were all close at hand.

The crude pectin produced contains aluminium hydroxide and while of excellent jelly forming powers may require purification for the English market. This point is one which the Imperial Institute will be asked to investigate.

F. H. S. WARNEFORD.

10th September, 1929.

1930-31.

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STAFF OF THE AGRICULTURAL DEPARTMENT, DOMINICA.

F. G. HARCOURT, F.R.H.S.	Agricultural Superintendent and Curator of the Botanic Gardens and Experimental Station.
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G. A. WINSTON	Clerk, P. I. B., & Govt. Trade Agency.
G. R. COOLS-LARTIGUE	Clerk.
A. C. WINSTON	Travelling Agricultural Instructor.
F. J. BAPTISTE	Foreman.
*C. ALEXANDER	Overseer.
*G. J. STEDMAN	Overseer.

† Died on 27th August, 1930.

* Temporary appointments.

LETTER OF TRANSMITTAL.

C.A. 680.

TRINIDAD,
12TH AUGUST, 1931.

Sir,

I have the honour to transmit the Report on the Agricultural Department, Dominica for the year ended March 31st, 1931.

2. The outstanding event of the year was the disastrous hurricane which struck Dominica on September 1st, 1930. It caused a further serious setback to the economic recovery of the Island following a series of misfortunes which include an outbreak of Wither-tip disease in 1922 and root disease in a virulent form following on the hurricanes of 1926 and 1928. Any one of these would have been a sufficient trial, a combination of all has been a disaster.

3. The one ray of hope is the result of the work of the Agricultural Department when in 1913 the then Agricultural Superintendent, Mr. Joseph Jones, laid down an experiment to demonstrate the value of limes budded on the hardy sour orange. Thirteen years later it was demonstrated that these budded limes were resistant to root disease and withstood hurricanes. In the present report it is stated that 24,000 budded or grafted limes were distributed from the Government nurseries and that in addition many of the larger estates did their own propagating.

4. Not only will it be possible to re-establish the lime industry on this basis, but the grapefruit, orange and lemon industries, also, become possibilities, for the sour orange is a suitable stock for most citrus and for most soil conditions, but not for all.

5. A long uphill fight is ahead of planters and peasants alike and they will need all the help that the department can give in re-establishing their cultivations. The departmental officers have also a serious responsibility, but a wonderful opportunity for service. This report indicates the organization which has been built up and is now in existence; plant nurseries, experimental work, agricultural education, marketing facilities, etc. It now rests with the growers and the department to avail themselves of this organization.

6. Much of the work described in this report has been made possible by the generosity of the Home Government. Loans for agricultural purposes have been freely made; a large sum of money has been placed at the disposal of the Agricultural Department for nursery work; the erection of a central fruit packing depôt fitted with cold storage facilities has been sanctioned and an experimental fruit farm has been established. Time will show whether these gifts and expressions of sympathy and goodwill have been fully appreciated and efficiently administered.

7. It is fitting that the report should close with an appreciation of the services rendered by the late Hon. J. C. Macintyre, M.B.E., to agriculture in Dominica. He stood for the principles which alone can bring success to the Island, steady industry, devotion to duty, spirit of enquiry and experimentation and co-operation between the growers themselves and the growers and the Agricultural Department.

I have the honour to be,

Sir,

Your obedient servant,

(sgd.) G. A. JONES,
Acting Commissioner of Agriculture.
Imperial College of Tropical Agriculture.

His Honour
The Administrator.
DOMINICA.

REPORT ON THE AGRICULTURAL DEPARTMENT, DOMINICA.

FOR THE YEAR ENDED MARCH 31, 1931.

WORK IN THE GARDENS AND OBSERVATIONS ON PLANTS.

The outstanding and disastrous event of the year was the hurricane of September 1st which in its intensity was unparalleled within living memory of the Island's inhabitants.

Prior to the hurricane, extensive pruning of trees and shrubs had been effected. This work brought about a marked improvement, and mitigated to some extent the havoc wrought by the storm.

A detailed list of damage caused, would confuse rather than convey an adequate idea of the picture presented by the gardens immediately after the storm. It seemed as if three-quarters of the plant growth had been blown down. The losses appear irreparable both in replacement of specimens and in the destroyed beauty of the Garden. Large and interesting specimens destroyed include:—*Myroxylon Toluifera*., *Spathodea campanulata*., *Laportea longifolia*., *Michelia Champaca*., *Dalbergia lanceolaria*., *Cassia emarginata*., (3) *Eucalyptus* spp., *Bauhinia variegata*., *Hernandia sonora*., *Pithecolobium Saman* and *Ficus Vogellii*., *Dolichandrone platycalyx*., (2) *Berrya Ammonilla*., *Cananga odorata*., *Castanospermum australe* and *Dipteryx odorata*. Smaller trees and Palms destroyed include:—*Cela Afzeli*., *Tabernæmontana* sp., *Morinda citrifolia*., (4) *Ravenala Madagascariensis*., *Cupressus glabra*., *Portlandia grandiflora*., (12) *Caryota mitis*., and *Caryota urens*., *Bentinckia nicobarica*., *Cocos plumosa*., *Livistona altissima*., *Acrocomia sclerocarpa*., *Corypha gebanga*., and *Pritchardia pacifica*. Practically all trees were seriously damaged. The largest and grandest as, *Ficus Benjamina*, *Ficus altissima*, *Ficus elastica*, *Sterculia alata*, and the Samans (*Pithecolobium Saman*) surrounding the main lawn, are now approximately half their former size. Their pollarded stumps will never regain their natural beauty of form which before rendered them so conspicuous. Instead, a multitude of shoots and suckers are produced, necessitating thinning to procure order and shape. An after effect of the storm was the rotting at the flowering point of several Royal and Cabbage Palms, causing death of the palms. The *Caryota* palms forming an avenue leading to the stable were all blown down with the exception of two specimens. Two fine specimens of the Bunya Bunya Pine, *Araucaria Bidwilli*, lost their tops and were stripped of their branches.

Damage to the economic plots was heavy, nearly all the Cacao trees were heeled over and 236 uprooted. Only two Nutmeg trees remain of the once fine grove.

One Kola, and two Para rubber plots were so decimated that only a few battered trees survived. The *Hydnocarpus* collection suffered severely, three trees of *Hydnocarpus Wightiana* were destroyed, the remainder were badly battered, but it is hoped that they will recover.

After the storm labour gangs were first concentrated on (1) clearing of roads, (2) saving shaken and partly uprooted trees by putting them back in position, recovering and firming their roots, and in some cases replanting, (3) clearing the lawns before the grass became too long for the mowing machines.

Pruning and tarring of wounds were carefully performed. A valuable quantity of planks and posts were sawn from the fallen Saman and Eucalyptus trees. Immovable stumps were burnt. Repairs to damaged fences and walls were completed.

By the end of the year practically all cordwood and tree stumps had been removed from the decorative section, and debris clearance in the economic section, hillsides and Morne had reached an advanced stage. The satisfactory response to attention given to storm damaged trees has repaid the expeditious way in which the work was carried out.

The following plantings were made subsequent to the storm:—

1 Bed *Euphorbia splendens*., 1 Bed *Agave Franzosinii*., 1 Bed *Codiaeum* sp., 1 Bed *Crinum Asiaticum*., 1 Bed *Bromelia* sp., 1 Bed *Pandanus Sanderiana*., 1 Bed *Pandanus pacificus*., 2 Beds *Baptistii* var *variegata*., 2 Beds *Clerodendron fallax*. 27 Plants *Lagerstrœmia javanica*., 1 Plant *Cassia grandis*., 1 Plant *Couroupita guianensis* (Cannon ball

WORK IN THE NURSERIES.—PLANT DISTRIBUTION.

tree), 1 Plant *Parmentiera cerifera* (Candle tree), 1 Plant *Pongamia glabra* (Indian Beech), 1 Plant *Peltophorum Linnæi*, 1 Plant *Piscidea Erythrina* (Dogwood), 2 Plants *Cedrela Toona*, 3 Plants *Cupressus Bermudiana*.

Seeds and cuttings of required specimens are being propagated for planting during the coming year.

Memorial Park. Re-arrangement and replanting of several decorative shrub beds, and the planting of a line of *Lagerstroemia javanica* bordering the surrounding *Acalypha* hedge has greatly improved the general appearance. A large mango tree destroyed by the storm was removed. Three shade trees of *Sarcocephalus cordatus* were planted round the War Memorial.

Storm

Library Gardens. Maintained in good order. ~~Some~~ damaged trees pruned.

WORK IN THE NURSERIES AND DISTRIBUTION OF PLANTS.

Citrus Nurseries. The number of budded citrus sent out during the year was 29,138 as against 8,922 for 1929. The increase is accounted for by the quadrupling of the output of budded and grafted limes and more than doubling that of grapefruit. It serves as some indication of how the Department is systematically developing the production of this type of plant.

At one period it seemed as if there would be a surplus of plants in the Department's nurseries and notices to that effect were inserted in the press. However, the September hurricane so quickened the demand for plants that over 15,000 budded lime plants were sent out during the last three months of the year.

The greatest set-back was a severe attack of Citrus Scab on the sour orange at the Copt Hall nursery. It assumed alarming proportions in February and continual spraying with Bordeaux mixture was deemed necessary to keep the disease under control. This proved costly, while the stocks made poor progress, a large quantity becoming so enfeebled that they had to be destroyed. Another handicap with this nursery was the persistent attacks on sour orange stocks by root grubs. As a result it was decided to concentrate on available land at the Botanic Gardens and Experiment Station.

The work of distribution was organised to enable the same land to be (1) forked, (2) cleaned, (3) where possible manured or mulching material incorporated with the soil, (4) bedded and (5) replanted with stocks.

The remaining plants, too small to send out, were root and top pruned and bedded together. These it may be mentioned developed better root systems through the additional shift. Poor and exhausted land was lightly forked, sown through with horse beans and allowed to rest. Systematic execution of this work enabled the main nurseries to be replanted with all available stocks, in addition to a substantial number of transplanted budded plants which will be ready for early distribution in the ensuing season.

Two and a half acres of land in the Experiment Station, rendered available by the hurricane destroying the seedling lime trees, was converted into a nursery and planted with stocks. After planting, the stocks were mulched. Somewhat later it was discovered that the stocks were being eaten and barked by crickets, prompt removal of all mulch effectively controlled the pest.

Approximately 26,000 sour oranges were purchased during the Autumn and the seed sown, as well as an ample supply of grapefruit and rough lemon.

A particularly dry season severely hampered nursery work. Since the taking over of the Copt Hall estate fresh nurseries have been opened and planted with stocks. Extensions continued of the nursery at the Cabrits, Portsmouth.

The following table gives the number of (1) budded plants and (2) stocks planted out for budding in the main nurseries at the end of the year. (Excluding stocks in seedling stage:)—

Nurseries in vicinity of Botanic Gardens.

Stocks 43,000. Budded or Grafted Limes 10,000.

Copt Hall Nurseries.

Stocks 2,000. Budded Grapefruit 1,400, Oranges 800, Lemons 1,200.

PLANT DISTRIBUTION.

Cabrits.

Stocks 10,000. Budded Limes 3,100.

The above totals are in excess of the numbers ordered.

Hurricane.

Damage in the ~~minimum~~^{nurseries} was limited to the loss of approximately 200 young budded plants. In one spot a whirlwind seems to have so twisted some 5,000 sour orange seedlings that they withered and died. Nearly all nursery plants were badly loosened at the collar, and were refirmed as speedily as possible.

Estate Citrus Nurseries.

Every assistance was given to Estate Nurseries by way of advice, spraying, and providing budding materials, while the number of buds inserted by the Department's budders for estates was over 7,200. All the large and more progressive estates have their own nurseries and this advantage of having plants on the spot adds greatly to the success of new plantings.

Nutmegs, Cacao & Coffee.

All orders for Nutmegs, Cacao and Coffee were filled leaving a substantial surplus at the end of the year.

Coconuts.

The demand for plants has fallen off to such an extent that several nurseries have not been replanted. Further the hurricane has made it difficult to procure seed nuts. As good seed becomes available small nurseries will be maintained at Roseau, Portsmouth and Marigot.

Julie Mangoes.

A number of grafted plants were distributed. The budding of seedling trees on Estates by the Department will be undertaken in the coming year.

PLANT DISTRIBUTION.

Name of Plant.	Total for 1927.	Total for 1928.	Total for 1929.	Total for 1930.
Washington Navel Oranges	1,184	860	768	778
Budded Oranges (other)	—	—	—	17
Grapefruit	1,280	1,529	759	1,633
Portugal Orange	46	22	22	53
Mandarin	23	16	7	13
Sweet Lime	20	12	6	36
Tangerine	37	14	12	50
Seedling Limes	31,610	8,310	300	1,500
Budded & Grafted W. I. Limes	—	1,117	6,182	24,100
Limes (other Varieties)	1,406	1,916	953	767
Lemon	—	838	213	1,691
Coconuts	10,195	12,238	7,489	1,067
Cocoa	7,860	11,866	12,865	8,384
Coffee	22,114	30,965	48,037	4,725
Grafted Mangoes	194	205	288	323
Seedling Mangoes	20	54	18	94
Nutmeg	4,901	1,555	1,995	1,660
Tobacco	4,800	1,482	—	100
Mangosteen	248	33	71	8
Sour Orange	1,275	2,012	8,600	2,859
Papaw	514	1,396	284	40
Tannias	2,624	6,434	16,362	5,110
Camphor	313	50	—	—
Black Pepper	448	96	—	76
Onions	9,100	4,500	—	12,100
Sugar Cane Cuttings	—	—	26,643	—
Miscellaneous	5,908	967	6,076	17,777
	106,120	88,487	137,950	84,961

INSECT PESTS AND FUNGUS DISEASES.

PLANT IMPORTATIONS.

Plant introductions during the year were as follows :—

Plants. *Ananas sativa*, *Couroupita guianensis*, *Corypha umbraculifera*, *Vitex negundo* var *incisa*, *Bambusa nana*.

Seeds. *Phaseolus vulgaris*, *Fragaria* sp., *Datura stramonium*, *Monarda punctata*, *Stillingia sylvatica*, *Citrullus colocynthis*, *Aleurites montana*, *Carica papaya*, *Mangifera indica*, *Derris scandens*, *Crinum asiaticum*, *Ornithogalum cordatum*, *Poinciana Gilliesii*, *Phaseolus vulgaris* vars. *Otheneshi*, *Koteneshi*, *Cajanus indicus*, *Phaseolus Mungo* (Wooly Pyrol), *Citrus medica* (Chile Lime var.), *Mucuna aterrima*, *Cooperia pedunculata*, *Jatropha podagrica*.

WORK CONNECTED WITH INSECT PESTS AND FUNGUS DISEASES.

Red Root disease continued to take its toll of the remaining seedling limes.

The ravages of root grubs, mole crickets and citrus scab in some of the Department's nurseries (recorded under "Nursery Work") have fortunately had much less serious effect on estates.

Stringent enforcement of regulations governing the importation of planting material from the United States of America and other Countries has so far resulted in the prevention of the introduction of the Mediterranean Fruit Fly and the equally dangerous Citrus Canker, and while these measures may have proved a hardship in certain cases, planters as a whole realise their necessity and have co operated with the Government in keeping the conditions imposed by the law.

Amongst existing pests and diseases which have not assumed more serious proportions than usual may be mentioned the orange moth, coconut white fly, various leaf-eating beetles. Panama disease of bananas. Rosellinia root diseases, collar-rot of limes, and of course withertip and blossom blight.

To varying degrees these have all contributed to a certain loss of crop and sometimes the lowering of resistance due to the hurricane has resulted in a certain number of trees being lost from some of these causes.

Scale insects and black blight have checked and occasionally killed some of the young citrus plantings. Planters are beginning to realise that spraying in the critical stages of the young plants is not an emergency measure, but must be considered as part of the routine work of bringing young plantings into bearing. A poison incorporated with the anti-scale sprays or applied separately would do much to mitigate set-backs caused by the depredations of leaf-eating beetles thus reduce the mortality of citrus or Sour Orange, which stock is particularly prone to the attack of their larvae. Hand-picking of the adults on a nursery scale has also proved effective.

Specimens of previously unrecorded pests and diseases have been submitted to the Advisory Department of the Imperial College from time to time. but in most cases the material and information was too meagre to be of definite use. These have included Julie mangoes with peculiar gall like protruberances; hypertrophied mango twigs; a beetle found on coconuts, a P. O. J. variety of cane with chlorotic patches on the leaves suspected of being affected by "Pokkah Boeng" (*Fusarium moniliforme* and other spp.) and also oranges affected by the orange moth already recorded for a number of years at Sylvania. Attempts to collect further information and material will be made in order to have these troubles investigated, and the visit of an entomologist is under consideration.

The following extracts of observations by Dr. Briton-Jones should be put on record however :—

Navel Oranges with blemishes on the outer rind.

"The disease is diagnosed as oleocellosis or Citrus-oil spot. The collapse of the tissue between the oil glands is due to the damage caused by the exudation of the oil from the glands. The cause of the exudation in the field cannot be given with certainty because it might be due to very heavy rain, insect damage, chafing etc. The Assistant Agricultural Officer may be able to find out the cause from the information given him. To attempt it from this end would be speculation which I think is unwise to indulge in."

Leaves of Cane P.O.J 2878.

"I cannot diagnose this disease with any degree of certainty unless a complete plant

LIME EXPERIMENT STATION.

affected by the disease is sent. Leaf symptoms are helpful and this has symptoms in common with Leaf Scald—a dangerous bacterial disease. On the other hand it may be nothing of the kind. I would, however, strongly recommend that the affected cane be very carefully watched and that the canes be ratooned as soon as possible to see if similar symptoms develop on the suckers.”

(sgd.) H. R. BRITON-JONES,
Mycologist.

LIME EXPERIMENT STATION.

The Seedling Limes under manurial experiments having been almost completely destroyed by Root disease and Hurricanes, replanting, which had already commenced before the hurricane, has been continued on a more extensive scale, with the following chief objects in view :—

- (1) Trials of stocks for comparison with the Sour Orange.
- (2) Distance trials in varying situations.
- (3) Demonstrations in the planting and management of budded citrus.
- (4) Cover crop trials in conjunction with the above.
- (5) An extension of the collection of varieties of Oranges, Grapefruit and Lemons not already adequately represented.

The original *nine* quarter acre-plots numbered 13-21 which formed part of the manurial experiments, were converted into *three* series, viz: A. B. C., each consisting of three plots planted thus (1) Limes on Sour Orange, (2) Limes on Rough Lemon and (3) Limes on Grapefruit.

Prior to the new system of planting, the plots were (1) cleared of disease ridden seedlings, (2) hoed, drains cleared, holes dug and (3) sown with horse beans (*Cynavalia ensiformis*). In A and C the alternate system of planting was adopted 20' x 20' apart.

With the exception of one plot in A, the whole area was planted. It was deemed prudent to postpone further planting until the following wet season.

Other Experimental plantings of limes.

Three and a half acres of land unsuitable for the siting of accurate parallel plots were planted, partly for the purposes of revenue, but mainly with the intention of experiment.

(1) Comparison between limes budded and grafted on the sour orange.

Situation. “Old Lime” Piece—44 plants planted 20' x 20' grafted.

“ ” ” 47 ” ” ” ” budded.

(2) *Planting distances.* *Planted.*

Situation. “Jacks Well” —66 plants 25' x 25'

It is the intention to plant a similar area at reduced distances.

(3) *Trial of Seedless Lime*—discovered by Mr. H.D. Shillingford.

Situation. *Plot 12.* Planted 20 on grapefruit stocks 20' x 25'.

(4) *Mulch grass experiments.*

Situation. “*Martin's Field.* (1) 71 plants 20' x 20' grafted, intersown with horse beans.

(2) 73 plants 20' x 20' grafted. Approximately half planted with Lemon grass (*Cymbopogon citratus*), and half planted with Vetiver (*Vetiveria Zizanioides*), in the following way:—

The grass is planted about 18 inches from the edges of the drain which runs midway parallel to the rows of trees, and a clump of grass alternately planted between them. *Tephrosia candida* is sown in the intervening space leaving the tree clear in a diameter of 8 feet.

Another method, though admittedly not the best practice is to provide a newly planted tree with clumps of *Tephrosia* about 8 feet from the tree with an inner ring of horse beans. This affords protection against winds, and smothers weeds. This method has been adopted on Estates without the desire or means to intercrop between their young trees.

The various cover crops under trial include species of *Vicia* received from Guadeloupe, *Calapogonium muncunoides*, Woolly Pyrol and the Bengal Bean.

AGRICULTURAL LOAN BOARD.

(5) *Plantings of other Citrus.*

Lemons. The plot formerly occupied by the spineless limes and removed in 1928 has now been planted with 15 Villa Franca lemons, and 9 of the Meyer variety.

Grapefruit. An addition to the collection was made by planting five trees of the Foster variety, thus extending the former grapefruit plot.

Oranges. Immediately above the higher grapefruit plot nine Valencia orange trees were planted to replace the few trees of Rangpur Lime and Citrus Hystrix, and four Jaffa trees below the Target enlarged the collection there.

(6) Other plantings included 1 acre of mulch grasses and 140 coconut plants to replace those destroyed by the hurricane.

Hurricane Damage.

A few battered trees in the sheltered parts of "Jacks Well" and "Old Limes" are all that remain of the seedling limes. Plots of fully grown budded limes in an exposed area i.e. below the driver's house, suffered severe damage, half the main branches being torn off. No trees on sour orange stock were uprooted. Grapefruit plots were defoliated, with a loss of the entire crop. About 150 coconut trees were destroyed practically all leaf stems broken down and crops lost.

The land hitherto occupied by Plots 1-11, which formed the principal area under lime manurial experiments, has since the hurricane been converted into a citrus nursery, and as such will be used while the urgent need for plants exists.

This area will, under such treatment, become balanced and more suitable for future experimental work.

The end of slowly-dying trees was considerably hastened by the hurricane to the benefit of replanting operations. These could be more thoroughly carried out. Experimental planting will be continued during the coming year.

COCOA EXPERIMENTS.

The general conclusions to be drawn from the yields of the ten plots under manurial experiments since the earliest days of the Department were fully dealt with in last year's report. No further reliable information has since been obtained owing to the hurricane having destroyed a large percentage of the trees, and badly damaged those still standing.

So great has been the havoc wrought that it has become necessary to abandon the experiments. Some of the hillside plots capable of resuscitation will be "supplied" and continued as plots to demonstrate the value of good cultivation and the rational use of mulch and artificials. The remaining plots will probably be cut out and replanted with other economic crops, portions of the depleted plots have been temporarily utilised for nursery work.

AGRICULTURAL LOAN BOARD.

The number of estates assisted with loans has increased during the past year and the visits of Officers of the Department on inspections and for advisory purposes have been carried out as usual, half-yearly reports on progress having been submitted to the Board. Estates and Holdings totalling 6,500 acres are now cultivated with the help of loans.

While it is not possible to give detailed information of the nature of the loans, it may be worth recording that some of the earlier loans are beginning to bear fruit, notwithstanding the cyclones of 1928 and 1930. The latter has again been a serious set back to progress, however, and it is disheartening to planters in receipt of loans to feel that much of the expenditure has been negated thereby and additional expense incurred on storm damage measures.

Many of the larger estates in need of it had already had assistance, so that the recent loans have been more for the smaller proprietors. Everything possible has been done to accept the slender security usually offered by such and to minimise the obstacles standing in the way of advances being made, nevertheless it has been impossible in all cases, however deserving, to make advances; as for example where the property was already heavily involved, where the purposes for which application was made did not come within the scope of the Watts' Scheme, or where the persons concerned appeared unlikely to apply judiciously sums larger than they have been accustomed to handling previously.

DETAILS OF ADMINISTRATION.

DETAILS OF ADMINISTRATION.

EXPENDITURE.

The local votes for the Agricultural Department for the year were as follows:—

	£	s.	d.
Salaries Curator, Assistant Agricultural Officers, Clerk and Foreman }	1,388	0	0
Contingencies	13	0	0
Travelling Expenses	100	0	0
Maintenance	320	0	0
Cultivation Saleable Products etc.	300	0	0
Purchase Special Manures	100	0	0
Printing Reports etc.	40	0	0
Experiment Station	370	0	0
Upkeep of Horses & Mules	50	0	0
Upkeep Morne Bruce Lands & Military Cemetery	20	0	0
Chemicals & Apparatus	25	0	0
Telephone Rental	25	0	0
Rent of Quarters for Assistant Agricultural Officer... ..	30	0	0
Agricultural Instruction	432	0	0
	<u>£3,213</u>	<u>0</u>	<u>0</u>

The actual expenditure during the year under the above heads was £3,099. 8. 3½.

ADDITIONAL EXPENSES FOR SPECIAL SERVICES.

Grant for distribution of economic plants £1,320.

RECEIPTS.

	£	s.	d.
Limes	38	10	8½
Cocoa	27	8	5
Plants	273	0	0
Fruit	21	10	0
Nutmegs	1	0	0
Onion Seed	17	14	10
Vegetable Seed	5	16	6
Miscellaneous	7	13	10
Laboratory Receipts	34	0	0
	<u>£426</u>	<u>14</u>	<u>3½</u>

STAFF CHANGES, ETC.

Mr. F. L. Squibbs, Assistant Agricultural Officer, returned from leave and resumed his duties on April 11th. Mr. V. G. Pereira who had assisted the Department during Mr. Squibbs' absence then returned to Antigua.

Hon. J. C. Macintyre, M.B.E., died of pneumonia on August 27th after a short illness. Mr. H. B. Pidduck, Assistant Agricultural Officer, took over the duties of Peasants' Adviser and Government Trade Agent following Mr. Macintyre's death.

Mr. R. A. Kitching, Assistant Agricultural Officer, was appointed to manage the Copt Hall Experimental Fruit Farm arriving in Dominica on the 18th September. Mr. L. Oscar was appointed as Overseer at Copt Hall Experimental Fruit Farm.

Mr. H. B. Pidduck was transferred to the Northern District on the 20th January taking up his residence on the Hampstead Estate. The duties of Acting Government Trade Agent and Peasants' Adviser were then taken over temporarily by Mr. R. A. Kitching.

The Curator and Agricultural Superintendent proceeded on six months leave on the 28th March. Mr. F. L. Squibbs was appointed to act during Mr. Harcourt's absence.

DETAILS OF ADMINISTRATION.

REPAIRS TO BUILDINGS, ETC.

Extensive repairs to damage caused by the hurricane were carried out on practically all the Department's buildings and shelters. Repairs to walks and fences were effected.

CORRESPONDENCE AND DISTRIBUTION OF INFORMATION ON AGRICULTURAL MATTERS.

Eight hundred and fourteen letters were despatched and four hundred and thirty-nine Minute Papers dealt with, exclusive of numerous Confidential and Loan Board Minute Papers. Over nine hundred bills were despatched during the year. Various pamphlets and copies of reports were distributed to planters interested.

PLANT AND SEED EXCHANGE.

Contributions of Plants were received from the following :—Dr. D. Thaly ; C.A. Gomez, Montserrat ; H.W. Werner, Esq. ; University of Florida ; A.E. Collens, Government Chemist Antigua ; A.H. Green, Esq. ; Alphanso Nelthropp, St. Thomas, U.S.V.I. ; Prof. H.A. Ballou, M.Sc., Commissioner of Agriculture ; Director of Agriculture, Barbados ; Agricultural Superintendent, Montserrat ; and H.C. Sampson, C.I.E., Royal Botanic Gardens, Kew.

Budwood, Seeds ^{or} and Plants were sent to :—Imperial College of Tropical Agriculture, Trinidad ; Agricultural Department, Antigua ; A. Nelthropp, St. Thomas ; Agricultural Department, St. Lucia ; and Agricultural Department, Demerara.

OFFICIAL VISITS TO THE DEPARTMENT, ETC.

His Excellency, Lt. Col. T. R. St. Johnston, Governor of the Leeward Islands, visited the Department and inspected damage caused by the hurricane of September 1st. Other visitors were :—G. Evans, Esq., C.I.E., M.A., Principal of the Imperial College, Trinidad ; Prof. H. A. Ballou, M.Sc., Imperial Commissioner of Agriculture ; Dr. S. C. Harland, Geneticist Cotton Research Station ; G. A. Jones, Esq., Dip. Agri., Asst. Commissioner (paid several visits), Hon. A. E. Collens, F.I.C., F.C.S., Government Chemist for the Leeward Islands.

LABORATORY WORK.

Work in the Laboratory increased during the year. The following tests were made for merchants and planters :—

Raw Lime Juice	12
Concentrated Lime juice	1
Bay Oil	440
Lime Oil	2

AGRICULTURAL INSTRUCTION AND VISITS TO ESTATES.

In addition to Loan Board work, the senior officers of the Department have during the year visited every part of the Island and practically every estate. The hospitality accorded by planters under the often difficult conditions of travelling in Dominica has been appreciated.

It has long been felt that an officer should be permanently resident in the Northern District, so that in January one of the Assistant Agricultural Officers was detailed for this work. The Travelling Agricultural Instructor was released from this district shortly afterwards and has since been engaged mainly in the Southern and South Eastern Districts. Most of the rest of the island can be fairly readily visited by officers residing in Roseau, and in consequence the whole island is now more regularly catered for.

One of the chief and most important duties of a travelling officer during this period of replanting is to visit Estates and Holdings to advise on and supervise the details of planting and after-care of the plants distributed free or at a reduced cost from the Department's nurseries.

This work is being assiduously carried out, especially where the more expensive budded and grafted plants are concerned.

Agricultural Instruction, both practical and theoretical, is given to about a dozen or more pupils at headquarters. The nature of this instruction was indicated in last year's report. There are also three pupils on propagation work at the Cabrits' Nursery, and

THE LIME INDUSTRY.

other country nurseries will undertake similar work next year. Numerous estates having their own nurseries have called upon these pupils (who rapidly become expert budders) to assist with their budding, and in the process help to train promising youths working thereon. There is nevertheless a demand for good budders as well as field overseers which the station-trained boys are able to supply.

All the Government Primary Schools throughout the island have now a small garden of their own, under the direct supervision of the Inspector of Schools. The Agricultural Officers have visited these gardens periodically and given not only advice on management, but practical and theoretical instruction to the senior pupils with a view of encouraging them to regard agriculture as an honourable calling and to study the scientific principles underlying planting operations. It is hoped in this way to prevent the exodus of some of the brightest youths of the peasant classes abroad or into offices and workshops.

THE LIME INDUSTRY.

Through the severe hurricane experienced on September 1st, the worst in living memory as far as Dominica is concerned, the lime industry received yet another blow, worse than any of the earlier disasters. The seedling lime, weakened by root disease, offered but poor resistance to the winds which played havoc with the depleted surviving trees; resulting in the death of thousands more. On some estates scarcely a tree stood erect; while there was practically a complete loss of the crop still on the trees and estimated at nearly 50% of the year's crop. It was indeed fortunate that a long spell of dry weather was responsible for early ripening and that half the crop had already been harvested. Thousands of trees not immediately destroyed have since succumbed.

The outlook could not well be worse and crop production during the next few years will fall to a very low figure and will not increase until recent plantings begin to bear. It is noteworthy that the Sour Orange stock again withstood the universal devastation and definitely demonstrated its suitability as a stock for use in the hurricane zone. Bearing citrus on this stock, both in the experimental plots and on several estates where seedlings were blown down wholesale, suffered little more than the loss of crop, while young budded plants put in only a few months prior to the cyclone were not appreciably affected and soon resumed their normal growth. The replanting of devastated areas continues, but this work has received a set-back since September through losses of numbers of young plants and a severe check to most plantings owing to the unusually dry weather for most of the six months since the storm.

The exports have dwindled rapidly, but fairly high prices were maintained, the maximum being 6/9 per barrel for ripe and 28/- for green limes. Oils remained high, 36/- per lb. being obtainable for handpressed and 25/- for distilled. For other lime products there was only a limited demand and the prices were generally unremunerative, comparing unfavourably with those for the previous year.

The following table gives the crop shipped since 1921, is calculated in barrels of fruit and expressed in round numbers, and will illustrate the decline of the seedling lime industry through a series of disease and hurricane causes.

<i>Years.</i>			<i>Barrels.</i>	
1921	...	...	516,000	Prior to appearance of Withertip.
1922	...	...	400,000	
1923	...	...	228,000	
1924	...	...	424,000	Includes carry over from 1923.
1925	...	...	230,000	
1926	...	...	214,000	
1927	..	...	210,000	
1928	...	...	205,000	
1929	...	...	183,000	
1930	...	...	114,000	

LIME HYBRIDS.

The following table calculated on the usual basis shows the disposal of the crop under various heads.

Products.	Barrels of fruit.	Approximate percentage of total crop.
Concentrated lime juice..	68,748	60.38
Raw juice	26,133	22.95
Fresh limes	17,676	15.52
Pickled limes	205	.18
Lime juice cordial ...	1,106	.97

50 gallons of con. juice represents 75 brls. of lime fruits: 7½ gallons of raw juice represents 1 brl. of lime fruits: 1 ton of citrate of lime is equivalent to 226 brls. of lime fruits: 1 ton of citric acid is equivalent to 400 brls. of lime fruits: 1 gallon of lime juice cordial represents 5½ brls. of lime fruits.

The exports of products of the lime industry during 1930 is recorded below :—

Products.	Quantity.	Value. £
Concentrated lime juice...	45,832 gallons	4,952
Raw lime juice	195,994 ,,	6,740
Lime juice cordial ...	201 ,,	98
Fresh limes	17,673 barrels	20,675
Pickled limes	205 ,,	178
Essential Oil (Distilled)...	25,677 lbs.	29,751
Otto of limes (hand-pressed or ecuelled).. <td>1,551 ,,</td> <td>4,216</td>	1,551 ,,	4,216
Oils in solution in Raw juice	—	5,079
		<u>£ 91,689</u>

LIME HYBRIDS.

The *Citrus aurantifolia* X West Indian lime hybrids fruited during the year and one or two trees of *Woglum lime* X West Indian. The fruits were lost during the hurricane before any tests of a comparative nature with the fruit of the West Indian lime could be made.

The young trees buffeted and twisted by the stormy winds were completely defoliated. With few exceptions they made good recovery, and responded to the care and attention given after the storm.

At least 50% of these crosses appear to be quite useless, but tests made with a few promising *Aurantifolia* crosses indicated acidity well up to standard. No tests have been made of the amount or quality of oil produced. In the meantime budded plants have been raised from some of the crosses in the event of their proving of value, whilst others have been crossed back with the West Indian lime as male parent, but there are not yet any mature fruits.

FRUIT INDUSTRY.

FRUIT INDUSTRY.

It is estimated that the hurricane was responsible for 75% loss of the grapefruit and orange crop. The fruit which remained on the trees, was not considered by growers to be of sufficiently good quality for shipment to Canada and was disposed of locally, or to the neighbouring Islands.

The trees were carrying very heavy crops at the time of the storm and prospects were good for a successful season.

During the year His Honour the Administrator was on leave in Canada and spent a good deal of his time in endeavouring to establish an interest in Dominica fruit, especially grapefruit. The Agricultural Department forwarded sample shipments of fruit which were distributed to interested parties. His Honour's efforts met with good results inasmuch as orders were placed for supplies of grapefruit at regular intervals and at a price remunerative to the growers. Destruction of the fruit by the hurricane unfortunately prevented these orders being filled. The following table gives the quantity of fruit exported from Dominica during the past four years:—

1927.

		Jan.	Feb.	Mch.	Apl.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Oranges.	Boxes	—	11	4	—	1	—	104	53	106	147	316	114
„	Brls.	24	18	7	—	—	1	7	54	42	353	264	136
G/fruit.	Boxes	83	30	25	3	—	—	—	4	7	112	241	222
Mangoes.	Boxes	2	—	—	34	—	1,565	2,558	150	36	—	26	27
A. Pears.	Boxes	11	—	—	3	—	3	89	236	189	437	151	98

1928.

Oranges.	Boxes	1	1	1	—	—	7	—	14	58	119	145	1
„	Brls.	3	3	2	—	—	—	1	23	36	121	82	16
G/fruit.	Boxes	46	35	5	2	—	—	2	5	33	71	196	227
Mangoes.	Boxes	7	—	12	155	1,665	2,442	—	315	87	48	—	1
A. Pears.	Boxes	—	2	6	2	4	1	113	276	447	146	37	2

1929.

Oranges.	Boxes	—	3	3	—	—	3	8	9	83	232	309	690
„	Brls.	—	—	1	—	3	1	2	3	15	47	127	65
G/fruit.	Boxes	123	33	—	—	1	1	1	—	3	105	346	637
Mangoes.	Boxes	7	12	12	37	58	1,524	2,660	549	423	2	—	—
A. Pears.	Boxes	—	—	—	—	—	—	16	205	461	329	340	219

1930.

Oranges.	Boxes	47	4	—	—	—	—	—	11	106	110	65	27
„	Brls.	11	7	—	—	—	—	—	23	10	41	50	12
G/fruit.	Boxes	546	83	123	11	4	—	—	5	4	33	80	28
Mangoes.	Boxes	—	—	—	245	522	1,446	903	245	2	—	—	—
A. Pears.	Boxes	—	—	—	—	—	—	135	520	408	19	8	—

The planting of young fruit trees is proceeding and there is a good demand for budded plants of grapefruit, oranges and lemons, also grafted mangoes. The varieties propagated for distribution by the Department are *Grapefruit*, Foster, Marsh's Seedless and Duncan. *Oranges*, Washington Navel and Valencia. *Lemon*, Villa Franca. *Mango*, Julie. Other varieties are only propagated for Departmental purposes and to fill definite orders from growers. The following table gives the number and varieties of fruit trees distributed by the Department during the last four years:—

FRUIT PACKING DEPOT.

Year.	W.N. Orange.	Grft. Mango.	Marsh's.	Triumph.	Grapefruit Other var.	Lemon.
1927 ..	1,184	194	—	1,280	—	—
1928 ..	860	205	367	1,160	—	838
1929 ..	768	288	413	346	—	213
1930 ..	778	323	908	280	445	1,691

FRUIT PACKING DEPOT.

A large building situated in Roseau and known locally as Lot "K", was purchased by the Government for use as a central fruit packing dépôt. Arrangements have been made for the dépôt to be equipped with a cold storage plant and up-to date machinery for the grading and general preparation of grapefruit and oranges for the market. It is anticipated that the dépôt will be fully equipped before the next fruit season.

COCOA.

The export of cocoa was 3,666 cwt. valued at £5,490 against an export of 2,456 cwt. valued at £4,575 during 1929 showing an increase of 1,210 cwt. The cocoa market was greatly depressed and much lower prices were realised.

Cocoa cultivations were badly battered by the hurricane and the late crop almost completely destroyed.

There is still a fair demand for young plants and 8,384 were distributed during the year.

COCONUTS.

There was an increase in the export of copra, 1,016 cwt. being shipped in 1930 as against 510 cwts. in 1929. The number of dried nuts exported was 96,802 as against 63,662 in 1929.

Plantations were very severely damaged by the hurricane. On one estate alone over two thousand bearing trees were destroyed. Very little new planting was done during the year, except for supplying trees lost in the storm. There is very little demand for coconut plants.

COFFEE.

This crop in common with others suffered severely from the hurricane. Exports for the year amounted to 383 lbs. as against 152 lbs. in 1929. A considerable number of plants have been distributed during the last few years, but it is feared that a high percentage of these have been lost through hurricane and other causes.

VANILLA, NUTMEGS & GINGER.

Very little interest was shown in the growing of these crops owing to a poor market for the products. Vanilla exports were 7,678 lbs. as against 3,654 lbs. in 1929. Prices were very low and flowers were only fertilized to a small extent.

Apart from one estate very little interest is taken in the cultivation of ginger. The exports for the year amounted to 6,573 lbs. as against 8,475 lbs. in 1929.

BAY OIL.

There was a falling off in the exports of bay oil owing to low prices. The quantity exported was 15,948 lbs. as against 18,349 lbs. for the previous year.

TOBACCO.

Interest in this crop is being revived by Messrs. Eugi & Fabian, Tobacco Growers and Cigar Makers, having decided to transfer their business from Tortola to Dominica. This firm has acquired land in the Portsmouth district for the cultivation of tobacco. Twenty acres of land have been prepared and planted, and plants are growing well. The crop should be ready for harvesting in March 1931.

Messrs. Eugi & Fabian are anxious for other people to plant and promise a remunerative price for dried leaf.

A factory has been established in Roseau for cigar making and about 40 girls are now making cigars from leaf transferred from Tortola. Black leaf tobacco is also being manufactured. It is the intention of this firm to build up an export trade as well as supplying local demands.

CHIEF EXPORTS.

CHIEF EXPORTS.

TABLE OF AGRICULTURAL EXPORTS FOR THE TRIENNIAL PERIOD
1928 TO 1930.

	1928.	1929.	1930.
<i>Lime Products:</i>			
Concentrated Juice ...	90,731 galls.	35,446 galls.	45,832 galls.
Raw Juice ...	306,090 "	475,102 "	195,994 "
Lime Juice Cordial ...	337 "	20 "	201 "
Distilled Oil ...	32,174 lbs.	30,894 lbs.	25,677 lbs.
Ecuelled Oil ...	7,677 "	5,256 "	1,551 "
Green Limes ...	27,065 brls.	16,476 brls.	17,461 brls.
Pickled Limes ...	225 "	67 casks	82 casks
<i>Cocoa Products:</i>			
Cocoa Raw... ..	572,348 lbs.	275,145 lbs.	409,536 lbs.
Cocoa prepared ...	417 "	434 "	36 "
<i>Coffee Products:</i>			
Coffee	1,669 lbs.	152 lbs.	383 lbs.
<i>Coconut Products:</i>			
Coconuts	253,817	63,662	96,802
Copra	189,366 lbs.	57,223 lbs.	113,831 lbs.
<i>Sugar Products:</i>			
Rum	403 galls.	252 galls.	68 galls.
Syrup	110 "	—	—
<i>Spices:</i>			
Vanilla	2,964 lbs.	3,650 lbs.	7,678 lbs.
Nutmeg	£10	£8	£3
Ginger	£312	£213	£108
<i>Honey Products:</i>			
Honey	120 lbs.	1,080 lbs.	126 lbs.
Bees Wax	—	93 "	—
<i>Various Products:</i>			
Bananas	3,393 bunches	448 bunches	2,453 bunches
Oranges	460 brls.	837 brls.	339 brls.
Mangoes	5,985 crates	5,309 crates	3,363 crates
Grapefruit... ..	729 "	1,248 "	917 "
Pears	£1,053	£1,568 "	£454
Miscellaneous fruits	—	£375 "	£1
Bay Oil	13,407 lbs.	18,349 lbs.	15,948 lbs.
Orange Oil... ..	742 "	1,116 "	2,835 "
Kola Nuts	1,800 "	—	—
Tamarinds	23 brls.	36 brls.	39 brls.
Vegetables	£52	£20	£120
Farine	£90	£18	£4
Hides & Skins	£87	£52	£38
Leather unmanufactured.	2,633 lbs.	2,231 lbs.	£137
Plants, seeds & bulbs ...	£4	£2	£4
Fruits, jams & jellies ...	£17	£10	£4
Turtle Shells	150 lbs.	242 lbs.	168 lbs.
Baskets	£6	£1	5/-
<i>Forest Products:</i>			
Hardwood	68,299 feet	47,150 feet	38,822 feet
Firewood	601 cords	538 cords	298 cords
Canoe Shells	64	64	£57
Shingles	£5	£3	£6
Charcoal	7,087 lbs.	5,021 lbs.	£1
Locally made boats ...	—	£53	£33
Total Values	£190,622	£172,303	£109,059

METEOROLOGICAL REGISTER.

METEOROLOGICAL REGISTER KEPT AT BOTANIC GARDENS, DOMINICA.

Year. 1930.	THERMOMETER.				Relative Humidity.	Thermometer.		Barometer Corrected. <i>Reduced to 32° Fh. Sea Level</i>		Rainfall.	Barometer Corrected.		Thermometer.		REMARKS.
	Dry.		Wet.			Max'm.	Min'm.	9 a.m.	3 p.m.		Highest.	Lowest.	Highest Maximum.	Lowest. Minimum.	
Months:	9 a.m.	3 p.m.	9 a.m.	3 p.m.	9 a.m.	3 p.m.									
January ...	75	77	69	70	72	66	68	30.04	29.96	10.65	30.10	29.86	84	65	
February ...	75	78	69	70	72	62	67	30.02	29.94	2.07	30.06	29.89	86	65	
March ...	78	81	70	71	68	56	69	30.00	29.92	3.89	30.07	29.87	89	65	
April ...	79	81	71	72	65	61	70	29.99	29.92	5.01	30.05	29.87	90	67	
May ...	81	83	74	74	68	52	72	30.02	29.95	2.21	30.09	29.87	90	70	
June ...	82	84	73	74	61	60	73	29.99	29.94	7.32	30.03	29.89	91	70	
July ...	81	82	74	75	72	68	72	30.00	29.95	7.90	30.07	29.89	91	69	
August ...	81	85	76	77	75	67	73	29.98	29.92	6.76	30.07	29.86	92	70	
September ...	84	88	76	78	66	60	73	29.95	29.89	14.66	30.01	28.80	95	71	Hurricane on 1st.
October ...	86	86	77	77	67	61	73	29.93	29.86	3.15	29.98	29.81	95	71	
November ...	84	86	77	78	67	65	73	29.94	29.87	5.51	30.02	29.80	95	69	
December ...	81	83	75	75	63	63	71	29.95	29.88	3.66	30.04	29.79	93	69	
ANNUAL 1930	81	83	73	74	69	62	71	29.98	29.90	72.79	30.05	29.77	91	68	

Highest Maximum Temperature = 95° on Sept. 11th. Lowest Minimum Temperature = 65° on January 31st.

„ Barometer (Corrected) = 30.10 „, January 24th. „ Barometer (Corrected) = 28.80 „, September 1st.

Greatest Rainfall in 24 hours = 4.95 „, September 2nd.

METEOROLOGICAL REGISTER.

RAINFALL RETURNS, DOMINICA, 1930.

STATIONS.	JAN.	FEB.	MARCH.	APRIL.	MAY.	JUNE.	JULY.	AUGUST.	SEPT.	OCTOBER.	NOV.	DEC.	TOTALS.
1. Batalie	L ... 4.89	1.09	.30	.72	.65	4.91	6.50	2.21	6.15	1.98	5.51	1.16	36.07
2. Botanic Gardens	L ... 10.65	2.07	3.89	5.01	2.21	7.32	7.90	6.76	14.66	3.15	5.51	3.66	72.79
3. Canefield	L ... 9.33	2.59	.73	2.51	2.91	7.56	8.94	6.26	11.75	3.54	5.50	3.45	65.07
4. Castle Bruce	W ... 15.61	6.88	5.32	14.06	10.01	17.13	16.96	11.71	24.12	14.05	30.78	6.91	173.54
5. Clark Hall	L ... 13.91	3.91	3.49	3.23	3.99	11.46	13.01	9.49	12.70	5.54	6.90	4.01	91.64
6. Morne Bruce	L ... 12.07	2.53	4.12	5.17	2.56	7.88	9.62	8.17	15.71	4.43	5.93	4.32	82.51
7. Governor	W ... 17.88	7.69	3.96	12.06	7.45	11.44	8.56	8.49	17.54	11.51	16.20	5.40	128.18
8. Hampstead	LAS. 8.69	5.87	1.52	3.61	6.80	5.38	4.69	5.96	13.82	5.67	10.47	1.83	74.31
9. Picard	L ... 10.67	2.68	1.30	7.84	1.95	7.46	11.34	8.17	10.56	3.23	5.92	3.25	64.40
10. Londonderry	LAS. 3.85	4.05	1.05	4.76	3.21	3.50	2.06	6.65	8.33	4.70	4.56	12.24	58.96
11. Pte. Mulâtre	W ... 10.17	7.27	4.76	10.95	4.57	8.55	9.27	6.38	13.73	10.87	7.76	5.53	99.82
12. Rosalie	W ... 7.64	6.73	3.45	6.95	4.65	13.80	7.80	5.00	14.62	9.84	13.34	4.26	98.08
13. Shawford	I ... 23.30	25.20	11.88	20.12	16.11	26.97	31.86	24.06	33.09	16.26	16.96	27.73	273.54
14. Sherwood	I ... 24.75	11.67	5.00	12.50	7.84	16.30	26.41	18.85	16.21	10.93	12.32	7.78	170.56
15. Stowe	W ... 10.84	6.73	4.47	12.29	3.20	9.75	7.91	8.72	13.67	8.67	8.44	5.11	99.80

Mean Rainfall 15 Stations ... 105.95 inches.

6 Leeward Stations... 68.75 "

5 Windward " 119.88 "

2 Inland " 222.05 "

2 Lasoye " 66.63 "

APPENDIX A.

GOVERNMENT FRUIT FARM AND LAND SETTLEMENT SCHEME
AT COPT HALL ESTATE.

During the year sanction was given by the Secretary of State to the purchase of an estate for a demonstration fruit farm and the organization of a Land Settlement Scheme. It was considered that the Agricultural interests of Dominica would be well served in this way as the farm would be cultivated for demonstrative and experimental work and be a useful training ground for local prospective planters.

Under the supervision and direction of the Agricultural Department the estate will be developed with grapefruit, oranges, immune limes etc. and eventually be cut up into holdings of five or ten acres in extent for intelligent occupiers whom the Agricultural Department will train and select from amongst the inhabitants of Dominica. Young men from the Dominica Grammar School will be especially encouraged and assisted to take up these holdings, for it was felt by the Unofficial Members of the Legislative Council that such might stem the tide of emigration of the more desirable type of native who now in increasing numbers have to seek a livelihood abroad.

There are numbers of intelligent local men who would like to engage in Agriculture, especially in the cultivation of permanent crops, but are prevented from so doing owing to lack of capital for the initial purchase of land and the expenses of cultivating such crops until they bring in a remunerative return. In the scheme, under experiment, it is proposed to give this type of man his opportunity by leasing to him the plots at a certain percentage of the appraised value of the land and its crops, with the option of purchase on easy terms at the appraised value at subsequent dates; the object being to place the occupier in a position to secure his livelihood from the time he takes possession. The Agricultural Department will work a central plot as an example to be followed by the holders of the other plots.

In the event of the scheme proving a success, it is the intention to promote similar schemes in other localities financed from the proceeds secured from the first scheme either from the sale or lease of the holdings.

An estate of 181 acres, known as Copt Hall, was purchased by the Government on the 20th August, 1930, for the purpose of putting the scheme into effect. This estate is situated in the Roseau valley, about two miles from the Headquarters of the Agricultural Department and is served by a good road. It has been virtually abandoned since withertip disease rendered the cultivation of limes uneconomic. The land contours of this estate appear to lend themselves to the following sub-division:—

- (a) Twenty acres for occupation by the Agricultural Department for demonstration, experiment and nursery work.
- (b) One hundred acres in ten plots of ten acres.
- (c) About thirteen acres represented in various pockets and suitable for peasants' allotments.
- (d) The remaining forty-eight acres is occupied by roads, water-courses, precipices, etc.

Mr. R. A. Kitching was appointed as Manager, and work was commenced on the 1st of October. Between this date and the 31st March the following work was accomplished:— Over thirty acres of land have been cleared, drained and fenced. Seven acres of this represents part of the Department's demonstration area in which the following plantings have been made: Mangosteen $\frac{1}{2}$ acre; King Mandarin Orange $\frac{1}{4}$ acre; Portugal Orange $\frac{1}{8}$ acre; Satsuma Orange $\frac{1}{2}$ acre and Sweet Lime $\frac{1}{8}$ acre. Catch crops planted in the demonstration area, are Bananas (Cavendish and Gros Michel) $4\frac{1}{2}$ acres, Coffee (Robusta) $2\frac{1}{2}$ acres. Cover crops of Horse Beans, Pigeon Peas, Tephrosia, Woolly Pyrol and lemon grass, have been planted through the various plots. Wind belts of Pois Doux have been planted where needed. An Overseer's house has also been built, and on this plot $\frac{3}{4}$ acres of mixed citrus planted for demonstration and for supplying budwood.

APPENDIX B.
IN MEMORIAM.

By the sudden death on August 27th 1930 of the Honourable J. C. Macintyre, M.B.E., Peasants' Adviser and Government Trade Agent, the Agricultural Department, as well as Dominica, has lost an efficient officer who will be difficult to replace and whose service will be sadly missed.

Mr. Macintyre was for a long time a member of the local and federal executive and of the Dominica Legislative Assembly, and, in addition to serving in numerous other public capacities, twice administered the government of Dominica. But noteworthy as was his public career, it was as a planter that he was best known. He was the owner of Hampstead Estate residing there until 1926 when he came to live in Roseau. His keenness in Agriculture is illustrated by his contribution to publications issued by the Imperial Department of Agriculture, notably with reference to the local experiments in lime juice concentration and the booklet on "The Cultivation of the Lime in the West Indies."

As far back as 1907 he attended the Agricultural Conference in Jamaica, and was one of the first to advocate closer trade relationships with Canada, where he represented Dominica in 1912 and at the Toronto Exhibition in 1927 and carried out important propaganda work.

In 1926 he joined the Agricultural Department as Peasants' Adviser under the Watts' Scheme, and as such did much useful work in assisting peasants and finding markets for their produce; while in 1929 he became the local Government Trade Agent. As a result of his pioneer work in this direction, the foundations of a successful fruit trade have been laid.

APPENDIX C.
**PEASANTS' INFORMATION BUREAU & GOVERNMENT
TRADE AGENCY.**

The functioning of the Peasants' Information Bureau during the year was considerably curtailed by the effects not only of the 1930 hurricane, but to a large extent by the aftermath of that of 1928, as will be seen by a study of the appended table of produce and fruit dealt with.

The recently instituted Government Packing Dépôt, however, handled a gradually increasing quantity of citrus and other fruits, shipped mainly to Bermuda, and some to Canada, during the second and third quarters of the year, so that the figures virtually represent the tail end of one season and the first shipments of the next. They are consequently more promising than would appear, and indeed the position in August was distinctly hopeful.

On the other hand other produce showed a progressive decline, the reasons for which have been fully dealt with elsewhere in this report. Apart from the reduced crops due to the previous hurricane, there was a slump in most of the products hitherto dealt with by the Bureau and profitable markets were difficult, if not impossible, to obtain.

On August 27th the Honourable J. C. Macintyre, M.B.E., the officer in charge of these branches died suddenly and the Assistant Agricultural Officer Mr. H. B. Pidduck was temporarily given charge, continuing in the post until the end of the year.

Damage done by the hurricane was considerable, the roofing of the packing dépôt being almost completely stripped, and a large consignment of avocado pears and other fruit damaged *in situ*, while one lighter-load capsized alongside the steamer. This was the largest shipment of the season and resulted in debit notes to most of the shippers.

Unfortunately, arrangements which were in progress for the shipment of large consignments of grapefruit and oranges to Canada had to be abandoned as the direct result of the hurricane, although efforts were made to maintain our position as far as possible in the Bermuda market.

The dépôt has since been re-roofed and the installation of a refrigeration plant is to be effected shortly, so that in the next season it will be possible again to continue the building up of a fruit industry with Canada and Bermuda along right lines.

APPENDIX.

STATEMENT OF PRODUCE DEALT WITH BY THE PEASANTS' INFORMATION
BUREAU FOR THE PERIOD 1ST APRIL 1930 TO 31ST MARCH 1931.

<i>Produce.</i>	<i>Quantity.</i>	<i>Cost of Estimated value of produce.</i>
Concentrated lime juice ...	6 Casks	£22. 4. 4
Cocoa	1 Bag	2. 10. 0
Vanillas Cured	36½ lb.	2. 18. 4
<i>FRUIT.</i>		
Green limes	21 brls.	22. 15. 6
Mangoes	36 crates	16. 17. 4
Grapefruit	15 „	2. 7. 0
Bay Oil	1 Tin	3. 7. 6
		<u>£73. 0. 0</u>

Fruit accounted for through the Government Trade Agency during the period 1st April 1930 to 31st March 1931.

Grapefruit	98 Crates	£11. 0. 5
Oranges—Navel	84 „	21. 3. 7
„ —Seedling	151 „	51. 10. 11
Limes	334 „	178. 6. 10
Lemons	45 „	26. 3. 10
Mangoes	1,062 „	396. 6. 6
Pears	1,034 Lugs	131. 10. 11
Pineapples	20 Crates	5. 1. 1
Coconuts	9 Bags	6. 11. 6
Farine	10 Boxes 50 lbs. each	5. 7. 5
	<u>2,847</u>	<u>£833. 3. 0</u>

